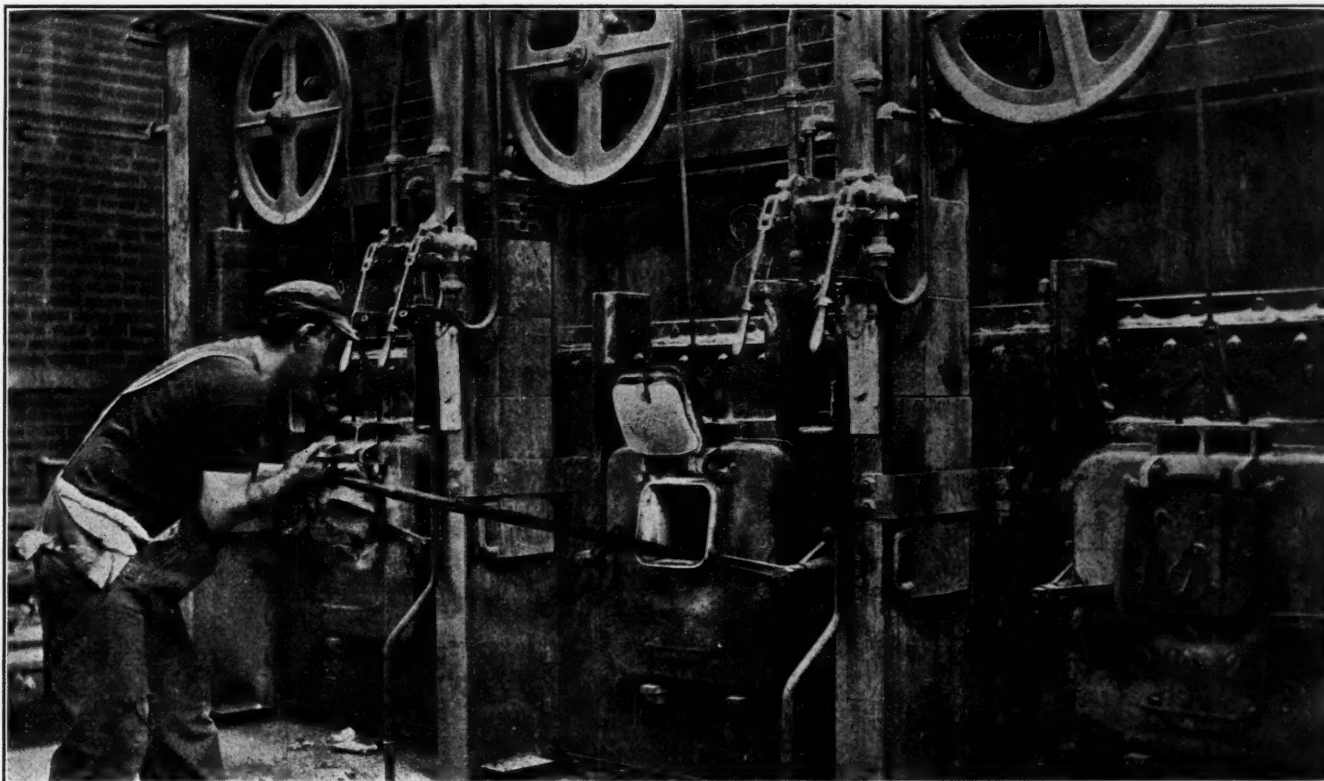


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SPREADING A CHARGE ON THE UPPER GRATE.

Just above the head of the stoker may be seen the handles of the valves by which the hydraulic rams are caused to open and close the bottoms of the containers.

PATERSON REFUSE DISPOSAL PLANT

**Destructor Burning Sixty Tons in Twenty-Four Hours—Steam Generated by Plant Used for Lighting and Power—
Details of Plant and Operation—Engineer's Report of Test.**

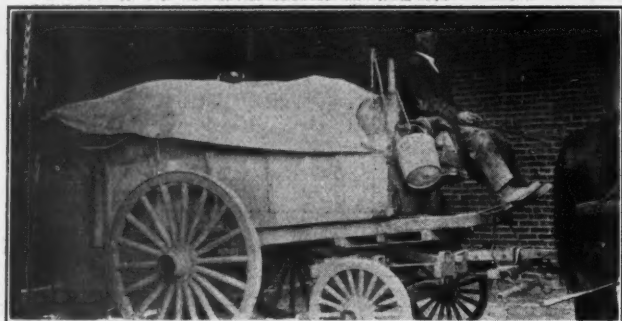
The city of Paterson, N. J., on October 17, 1911, opened bids for a refuse disposal plant, this to include the foundations and building as well as the plant in all its details. Among the conditions were that the plant should have a capacity of 60 tons in 24 hours; that the temperature in the combustion chamber should average not less than 1,500 degrees and should at no time fall below 1,250 degrees; that there should be a regenerator or pre-heater to heat the air for the forced draft; 2 boiler feed pumps; a steam superheater; a feed water purifier and heater; apparatus for ventilating the building; clinker buckets and railway for removing the same, and overhead railway and crane for lifting the buckets and carrying them outside the building. The steam boiler was to be of not less than 200 horsepower, part of the steam to be used for generating electricity to light the building with 10 arc and 25 incandescent lamps and also to operate the cranes, and for pumps and other machinery. From data furnished by the company which had been collecting the refuse of the city for some time previously, Col. William F. Morse, the consulting engineer for the

city, believed that the amount of ashes in winter would not exceed 53.8 per cent by weight, and that the garbage would not exceed 39.5 per cent in summer.

The contract for this plant was awarded to the Destructor Company, which used in the installation a Heenan destructor, but with a number of modifications from the English type and those which had previously been constructed in this country, principally for the purpose of reducing to a minimum the labor required to operate the plant.

The contractors were required to operate the plant for one year with two men per shift, and during that time to run an official test. After running the plant for six months, such a test was made in December last by H. de B. Parsons, and the plant reported as complying with the contract; and, following this test, in accordance with a further provision of the contract, the plant is being operated by the company (but at the expense of the city) for a further period of six months to demonstrate the cost of operation.

The process to which the refuse is subjected at the



CART USED FOR COLLECTING MIXED REFUSE.

plant is as follows: The carts bringing the refuse dump this directly into a concrete-lined pit, having a capacity of 60 tons, and which is below the surface of the ground so that the carts do not have to climb a ramp or other graded approach. This pit is inside the building at the middle of one end. It is cleaned frequently with scalding water. Directly under the roof, over the centres of the four furnaces, runs a track carrying an electric crane. This crane raises and lowers a large clam-shell grab bucket, and carries an operator's cage. The bucket is lowered into the pit, secures a load of one cubic yard of refuse and is then raised to a point a few feet above the top of the furnaces. There are four furnaces, and above each is a steel container which holds something over one cubic yard. These four containers end at the top in a trough-shaped floor, and the bucket dumps the refuse into them.

At the bottom of each container is a door which slides horizontally on rollers and consists of an iron box filled with a flat arch of fire brick. This door is operated by a hydraulic ram. The opening of the container door drops a charge of refuse onto the furnace grate, a plain flat grate of cast iron, where it is distributed by the stoker by hand—the only hand work required in the entire operation. When the refuse has been burned to a clinker, the furnace grate is pulled out horizontally, also by a hydraulic ram, and the clinker drops onto the grate of the clinker cooling chamber. When sufficiently cooled, or when a desired amount of clinker has collected in the cooling chamber, it is pushed out of the chamber by a hydraulic ram, the piston of which is fastened to a cast-iron plate which forms the front of the cooling chamber. This plate is in two pieces, the narrow bottom piece being hinged to the upper part to permit of readily releasing any clinker which may become jammed under it. The walls surrounding the chambers are perforated cast-iron, air-cooled boxes.

When the clinker is shoved out of the cooling chamber by the hydraulic ram, it falls into a bucket carried by a small car running on a track along the rear of the four furnaces. The bucket is picked up by an electric crane traveling on an overhead track and carried to and through the end wall of the building, where it may be dumped onto a railroad car or cart. It is possible that later on a clinker crusher and other apparatus may be installed here for utilizing the clinker. At present it is used for filling in low land.

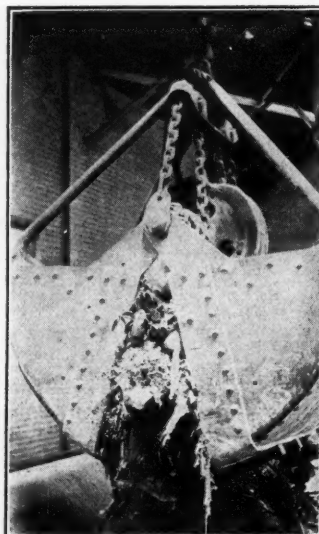
Under the cooling chamber runs the air duct through which the air for the forced draft is provided by a blower. The air, under a pressure of about 5 inches at the fan and 3 or 4 inches at the grate, having been previously heated by passing through the pre-heater, passes up through the clinker grate and cooling chamber, where it is further heated by the hot clinker and from here passes through the burning refuse on the upper grate, through a combustion chamber, which is common to the four furnaces, and a steam boiler, superheater and air

heater, and finally to the 150-foot chimney. The air used in the forced draft is drawn from the top of the building through a down-draft ventilator shaft and is said to be sufficient to renew the air in the entire building every two or three minutes.

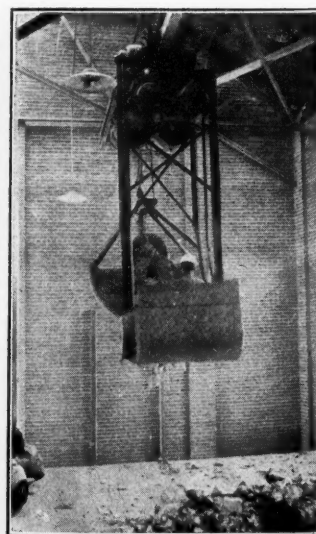
In passing to the chimney the hot gases are used to heat a water-tube boiler, which is placed alongside of the furnaces. A part of the steam from the boiler is used to operate a Terry steam turbine which generates the electric current. The boiler also furnishes steam for a Worthington hydraulic pump which maintains a hydraulic pressure of 1,500 pounds in a large accumulator, where the pressure is maintained while the pump is not working by means of a heavily weighted piston. The forced draft is furnished by a Terry turbine blower which makes 2,650 revolutions per minute. There are also two Worthington feed pumps.

The price for this plant was \$79,000 complete (excepting the site), with a guarantee that the cost of operation should not exceed 32½ cents per ton, and that the entire plant could be operated by two men in each shift. At the present time there is not sufficient garbage to keep the plant going for an entire shift of eight hours, and it is being operated as follows: About 11 o'clock in the morning some light rubbish, from the material in the pit or which was placed one side for this purpose the previous day, is thrown into three of the furnaces, and a charge of refuse is dropped into each furnace. Sufficient heat has been retained in the clinker which was left from the previous day and in the heavy masonry walls to ignite the rubbish, and in a short time the incineration is under full head. A new charge of mixed refuse is dropped into each furnace about once in every hour and a quarter, and by 2 o'clock the refuse on hand has generally been all placed in the furnace. The material in the furnaces at 2 o'clock is burned for about an hour, with no fresh refuse being added, and all of the odor-producing material burned out of it, when the furnace is entirely closed and the draft shut off and it is allowed to stand in this way until ready to start again the next day. During the burning of the refuse the steam in the boiler stands at about 125 pounds, and still remains at 75 or 80 pounds when the next day's run is begun.

It is evident from the above that very little strenuous labor is required in operating the plant, since the doors and grates are all operated by hydraulic rams which are



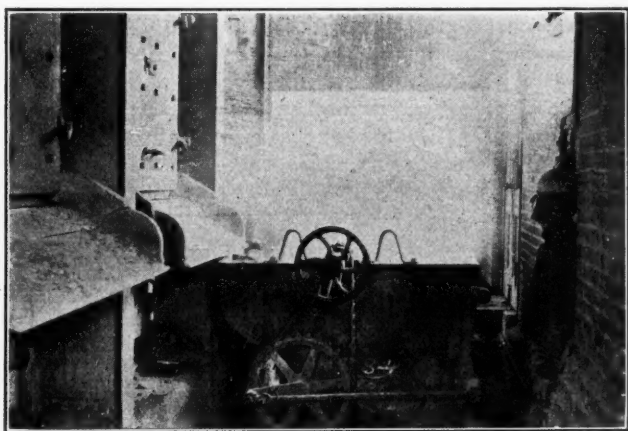
GRAB BUCKET PICKING UP LOAD FROM PIT.



OPERATOR'S CAR AND GRAB BUCKET, FROM TOP OF FURNACES.

controlled by the mere opening and closing of valves, while the raising and transporting of the refuse and clinker are performed by electric cranes. It is this feature which forms the principal novelty in this plant, a large part of this work being done by hand in the original English installations. At present the plant is being operated by two men.

As stated, the plant was tested in December, 1913, by Mr. Parsons, and two tests were run. The first was from December 1 to 6, inclusive, using two men and burning 20 tons in eight hours, it being agreed that the mixture delivered was to be as collected, but contain not more than 53.8 per cent of ashes nor more than 39.5 per cent of garbage. It was also proposed to run the plant the following week, using three men per shift and burning all which the furnace would consume in order to learn its maximum capacity. The temperatures were taken by a Fery radiation pyrometer, made by the Taylor Instrument Company. The thermometers and water meters used were first calibrated. The CO₂ was measured with a precision Simmance-Abady CO₂ recorder. The ashes exceeded the agreement in both tests, frequently running more than 90 per cent, and the company objected to the test as being unfair in this respect.



DISCHARGING CLINKER FROM CLINKER GRATE TO BUCKET.

Each morning during the first test about 22 tons of refuse was weighed and put in the storage pit and used for operating the plant during that run. When this had been burned the observations were discontinued, but the burning and the labor were continued for a full eight hours' shift. The superintendent confined his services to the reading of instruments and the giving of instructions to the two laborers operating the three furnaces which were in service. These consumed an average of 5,618 pounds per hour, or 22.47 tons per shift. The average composition for the week of the material burned was 8 per cent garbage, 14 per cent rubbish and 78 per cent ashes. No odors were noticeable outside of the building, although at times a slight odor could be detected 15 feet from the storage pit. The smoke at the stack did not exceed 12 per cent by Ringelmann's smoke scale and was visible an average of 187 feet from the stack. The clinker was thoroughly burned and practically free from organic matter. The gases in the combustion chamber averaged 1,600 degrees, the lowest temperature recorded being 1,350 degrees. The only condition which could be in any way considered a nuisance was a small amount of fine ash which was carried out of the chimney with the smoke and settled in the vicinity of the stack; but this ash was noticed only when the refuse furnished to the plant was very high in fine ashes. The average evaporation in the boiler was one pound of water to a pound of refuse, or 1.28 pounds

from and at 212 degrees, the maximum evaporation being 1.47 pounds from and at 212 degrees. The average evaporation was 5,590 pounds of water per hour, 742 pounds of steam per hour being used for operating the plant, or 12.9 per cent of the total evaporation. The average CO₂ was 11.25 per cent, the highest daily average being 13.5 per cent and the lowest 10 per cent. The average number of charges per furnace was 1.89 per hour, and the average number of clinkerings 0.94 per hour. Dust was cleaned from the combustion chamber not oftener than once a day.

The second test was run for two days only. During this, four furnaces were in operation with three laborers, and consumed an average of 7,518 pounds per hour, or 30.07 tons in eight hours. The average composition was 12 per cent garbage, 16 per cent rubbish and 72 per cent ash. There were no odors, and the dust and clinker were as in the first test. The maximum smoke was 2 per cent by the scale; the temperature in the combustion chamber averaged 1,589 degrees and had a minimum of 1,250 degrees. The evaporation in the boiler averaged 1.28 pounds from and at 212 degrees, the maximum being 1.37 pounds. The average evaporation was 7,598 pounds per hour. The average CO₂ was 12.5 per cent, the highest being 13.5 per cent. The average number of charges was 2.14 per furnace per hour, and the average number of clinkerings 1.05 per hour.

In conclusion, Mr. Parsons stated that the plant created no nuisance from either odor or smoke, although there was a slight amount of objectionable dust caused by the high percentage of fine ash in the rubbish and also by dumping the clinker car in the yard. The clinker was thoroughly burned. The evaporation of the furnace was highest when the percentage of ash in the refuse was lowest. The furnace met the contract requirements of temperature in the combustion chamber, of capacity to burn more than 20 tons in eight hours, and in the amount of steam generated, and the other requirements of the contract were substantially complied with. The six months' test which is now being run will determine whether the plant can be successfully operated with two men. If it should be found that a third man is necessary, the city is allowed by the contract to deduct from the contract price the capitalized wages of this man at \$2 a day.

A large percentage of the population of Paterson is composed of mill hands who are very economical in the use of coal, leaving a very small amount of combustible in the ash. It is also found that the garbage is low in fats and comparatively small in quantity, to which is added the fact that farmers from the vicinity remove a considerable amount of the richer garbage for feeding to swine. For these reasons the refuse furnished is unusually difficult to handle.

Snow Removal in New York.

The February snowstorm, followed by a long continuance of almost unprecedented cold, and this again by the March snows, has given the snow removal bureau of the New York Street Cleaning Department a more difficult job than it has ever before encountered since snow removal began. Daily since February 14 the department's contractors have been working all the wagons which could be hired and as many men as could be worked economically to fill them and loosen the frozen snow with picks. About one and a quarter million dollars has already been paid for removing 2,750,000 cubic yards of snow, in addition to what the city's own men and teams have done; yet a large part of the 570 miles of streets scheduled for snow removal are yet uncleaned.

EXTINGUISHING FIRES WITH SAW-DUST*

Burning Lacquer and Gasoline Extinguished in a Few Seconds—Sawdust Much More Effective Than Sand, Chemical Extinguisher or Water.

By E. A. BARRIER.†

In the latter part of July word was received from the Stanley Works, New Britain, Conn., through the Manufacturers' Mutual Fire Insurance Co.'s office, that experiments had been conducted at that plant on the extinguishing of fires in burning lacquer by means of sawdust, and that the results had been very satisfactory. A report was also sent covering in detail two tests which had been made.

The low cost of the material used, its simplicity, which makes its use more nearly resemble the fire pail than anything that has been previously suggested, the entire absence of any automatic device likely to fail to work at time of fire, and the fact that no special training would be necessary to enable the operatives to efficiently use the sawdust seemed to justify careful consideration of the subject before it was dismissed. At the request of the department, the Stanley Works very kindly consented to repeat the tests in the presence of a representative of the department. The writer was assigned to this work, and the tests were conducted in the yard of the Stanley Works on September 23. Four tests in all were tried. Two were in tanks 37 inches long, 14 inches wide and 16 inches deep, containing about 2 inches of lacquer; one in lacquer on a wooden floor and one in lacquer on the ground. The fires in the first three were readily extinguished with sawdust, and the fourth was extinguished with sand, although requiring a longer time than the sawdust when applied to the lacquer on the wood.

Although these tests at New Britain were entirely satisfactory, the proposition of putting out fires with a combustible material, such as sawdust, seemed to be so unusual that it was felt desirable to conduct a more extended series of tests. Especially was it desired to learn the effect of varying the size of the tank, the depth of the lacquer and the kind of lacquer.

Three tanks were accordingly obtained, built of sheet steel reinforced with angle irons. The largest was made 60 inches long, 30 inches wide and 16 inches deep; the middle tank 48 inches long, 14 inches wide and 16 inches deep, and the smallest 30 inches long, 12 inches wide and 16 inches deep. The joints were made tight with silicate of soda cement. Sawdust was obtained from a local sawmill, both soft and hard wood. The soft wood sawdust was probably a mixture of pine and spruce, and the hard wood apparently mostly oak. One barrel of sawdust was thoroughly dried to note the effect, if any, of moisture. It was thought possible that if sodium carbonate were mixed with the sawdust the formation of carbon dioxide resulting from the decomposition of the bicarbonate by heat might be of help in extinguishing the fire. A bushel of soft wood sawdust was accordingly mixed with 10 pounds of commercial bicarbonate of soda and used in the cases mentioned below. An ample supply of sand also was provided.

Commercial lacquer as used in their respective plants was obtained from the General Electric Co. at Lynn and the Stanley Works at New Britain. Nothing definite is known regarding the composition of these lacquers, but from their general appearance and odor it is quite certain that they both were amyl acetate-pyroxylin lacquers thinned with the usual thinners, such as wood alcohol, benzine, etc.

*Paper before the International Association of Fire Engineers.

†Chemical engineer, Associated Factory Mutual Fire Insurance Companies.

The tanks used in the tests were placed out in the open, well away from any buildings. The weather conditions were fair, although the sky was overcast. The wind blew from the northwest at a velocity of from fourteen to nineteen miles per hour.

The sawdust was applied by means of a snow shovel having a steel blade 11 inches wide and 15 inches long, and provided with a handle 4 feet long.

Sixteen tests were made. The first six were in the smallest tank. In the first, 2 inches of Stanley lacquer was placed in the tank and lighted, and 1 minute and 3 seconds afterward sawdust was applied, the fire being extinguished with $2\frac{1}{2}$ shovels of soft wood sawdust in 25 seconds. In the second test, 6 inches of the same lacquer was lighted, soft wood sawdust applied 2 minutes and 17 seconds later, and the fire extinguished in 12 seconds with 2 shovelsful. In the third test the sawdust (which floated) and 2 inches of the lacquer were removed from the tank, and the 5 inches remaining was lighted, dry soft wood sawdust applied 1 minute and 18 seconds later, and the fire extinguished with 2 shovelsful in 35 seconds. In the fourth test, 4 inches of lacquer remaining after the previous sawdust had been removed was lighted, and 1 minute and 19 seconds afterward a quarter of a shovel of a mixture of bicarbonate of soda and sawdust extinguished it in 10 seconds. The fifth test was the same, but the fire was extinguished in 8 seconds with one-third of a shovelful of this mixture. Another inch of lacquer and sawdust was removed, leaving 3 inches in the tank, and sand was applied in 1 minute and 3 seconds after the fire was started. Nine shovels of dry sand were used, but the fire was not extinguished for 1 minute and 55 seconds, when the tank was over half full of sand.

The middle size tank was used in test 7, containing 2 inches of G.E. lacquer. Sawdust was applied 1 minute and 2 seconds after the fire was started, and it was extinguished with 2 shovels of soft wood sawdust in 11 seconds. The sawdust and a quarter inch of lacquer were then removed, and in the eighth test the $1\frac{1}{4}$ inches remaining was lighted, sawdust applied 1 minute and 8 seconds later and the fire extinguished in 9 seconds with one shovel of a mixture of bicarbonate of soda and sawdust.

In the ninth and tenth tests a soft pine platform was used, 5 feet 2 inches square, with a rim raised 2 inches high on all four sides, on which about 2 gallons of G.E. lacquer was uniformly spread. The fire was started, soft wood sawdust applied 45 seconds later, and 3 shovels of it extinguished the fire in 53 seconds. The next test was with the same platform, but a 3-gallon chemical fire extinguisher was used, and the fire extinguished with some difficulty in 56 seconds. It was believed that if the extinguisher had not been used carefully and the platform not provided with a rim, the force of the stream would have spread the lacquer rather than extinguishing it.

In the eleventh test the lacquer remaining after the eighth test, $1\frac{3}{8}$ inches deep, was lighted, and the fire extinguished in 13 seconds with two shovels of hard wood sawdust. This sawdust was then removed, and the small amount of remaining lacquer again lighted and the wooden platform placed over the top of the tank; but after some time the platform caught fire and was removed, when the fire was extinguished with a small quantity of mixed sawdust and bicarbonate of soda. In the next test $1\frac{1}{8}$ inches of motor gasoline in the smallest tank was lighted, and was extinguished in 12 seconds with two shovels of soft wood sawdust. A small amount of gasoline had leaked onto the ground and caught fire, but this was easily extinguished in a few seconds with a small amount of sawdust. In the fourteenth test the

largest tank, containing 1½ inches of a mixture of G.E. and Stanley lacquer, was lighted, and the fire extinguished in 53 seconds with 9½ shovels of soft wood sawdust. The sawdust was then removed and the remaining material again lighted. The fire was nearly extinguished with 3 shovels of a mixture of bicarbonate of soda and sawdust, when the supply of this material was exhausted and the fire was finally extinguished in about 2 minutes with plain sawdust, although no special effort was made to get quick results. The last test was made with 2¾ inches of gasoline in the middle size tank, an effort being made to extinguish the fire with dry sand. Four shovels of this had absolutely no effect, and the fire was finally extinguished with 8 shovels of sawdust in about 56 seconds.

In each of these tests the material was thoroughly ignited and burning freely before any extinguishing medium was put upon it. The high velocity of the wind undoubtedly made the fires more severe than they would otherwise have been, and probably all of them could have been extinguished more readily if the tests had been made indoors.

In view of these tests, the following conclusions appear warranted:

1. Sawdust, if spread over the surface, will readily and successfully extinguish fires in inflammable liquids, particularly lacquer, when contained in moderate-sized tanks, such as those ordinarily used in manufacturing plants, or small fires in these liquids on the floor. The fires in gasoline, in tanks up to the middle-sized one which was used, were extinguished without difficulty, but there may be some question as to whether sawdust would have worked equally well on larger tanks.

The efficiency of the sawdust is undoubtedly due to its blanketing action in floating for a time upon the surface of the liquid and excluding the oxygen of the air. Its efficiency would be greater on viscous liquids than on thin liquids, since it would float more readily on the former than on the latter. The sawdust itself is not very easily ignited, and when it does become ignited it burns without flame. The burning embers are not sufficient to re-ignite the lacquer.

2. The character of the sawdust, whether from soft wood or hard wood, appears to be of little or no importance.

3. The amount of moisture contained in the sawdust is apparently not a factor. The dry sawdust which was used in some of the tests was prepared in order to represent the condition in which sawdust might be found after having been stored in a heated mill for some time. This material, however, was evidently as efficient as the untreated sawdust.

4. The depth of the lacquer in the small-sized tank was of no importance. Although no tests were made with varying depths in the middle tank, judging from the time that it took to extinguish comparative fires in the small and middle tanks, it is quite probable that depth would not have been a factor in the middle tank. This assumption is reasonable, because the only way in which increased depth could be a handicap would be in allowing the sawdust to sink and expose a fresh surface of liquid before the fire had been extinguished at all points. Whether or not this occurred would depend upon the length of time necessary to extinguish the fire, since the sawdust requires an appreciable time before it starts to sink.

With the largest tank, on the other hand, it is quite possible that with greater depths than those tried it might have been much more difficult to extinguish the fires. Tests at greater depths were not tried on account of the large quantity of lacquer required. This is not

as important as might seem at first thought, because it appears from a number of inquiries which have been made that the average lacquer tanks in Mutual Mills are about the same size as the smallest one employed in these tests, and that only rarely would anything larger than the middle-sized tank be found.

5. Sand is not satisfactory for extinguishing fires in lacquer tanks because, being heavy, it sinks to the bottom and does not have the blanketing action possessed by sawdust. At the Stanley Works' tests, the sand worked fairly well for fires in lacquer upon the ground, but even in this case it did not extinguish the fire with any more readiness than sawdust, and it was heavier and more awkward to handle.

6. The sawdust can best be applied by means of a long-handled, light, but substantially built, shovel with a blade of sufficient area to allow of taking up a considerable quantity of sawdust. The long handle is necessary to allow the operator to stand at some distance, since in some cases the fires were so hot that it was not possible to work at close range.

7. The admixture of sodium bicarbonate very much increases the efficiency of the sawdust, as shown both by the shortened time and decreased amount of material necessary to extinguish the fire. The effect of the carbon dioxide was clearly noticeable in the tests, in that the flame occasionally made an effort to shoot sideways and up from under the blanket of gas. It is probable that the bicarbonate mixture would have shown up to still greater advantage had it not been for the wind, which must have blown the gas away. A further advantage of the addition of the bicarbonate is that it will greatly decrease the possible danger resulting from the presence of sawdust in mills. It would be very difficult, if not impossible, to ignite the mixture by a carelessly thrown match, or by any other ready source of ignition.

There is a possibility that some difficulty might arise from the caking of the bicarbonate; but, if that should prove to be the case, it could be easily overcome by the addition of 10 per cent by weight of iron ore.

SNOW REMOVAL IN ST. LOUIS

Dumped into Sewers Through Openings Provided for That Purpose—Road Scrapers and Asphalt Trucks Used—Cost of Fifteen-Inch Snow.

By HARRY M. CRUTCHER.

The removal of snow from the streets was the principal feature of the St. Louis Street Department's work during the month of February. On the night of the 12th approximately fifteen inches of snow fell, making it imperative that the department work rapidly to open up the streets of the business section for traffic.

The street commissioner, Charles A. Talbert, was prepared for the emergency, having organized his forces for the systematic removal of the snow. Early in November the commissioner had called a meeting of his workers—the assistant commissioner, the superintendent of cleaning with his inspectors and assistants, the superintendents of all the districts with their assistants and inspectors and the superintendent of garbage removal with his inspectors. The manner of handling snow during the winter was discussed at this meeting, the idea being to handle the situation with dispatch and as great economy as possible. The various superintendents were given certain districts and they in turn assigned sub-districts to their assistants, inspectors and foremen.

The method employed in removing the snow was to load it into wagons and trucks and carry it to the vari-

ous dumps, eleven in number, which connect directly with sewers. The openings into the sewers at the dumps are 12 by 3 feet and are provided with cast-iron caps in the summer and removable wooden covers in the winter time. However, many of the "stiff" wagons (those not equipped with dumping device) carry their loads to the river levee, where the snow is deposited near the water's edge. The dumps are provided with water pipes carrying a five-inch stream, used to wash the snow into the bottom of the sewer. Men are assigned to the dumps to supervise the work. Sewer inspectors are on hand to see that the men do not dump rubbish with the snow.

Following a heavy snow immediate attention is given to the business district, bounded by Third street and Fourteenth street on the east and west and Market street and Franklin avenue on the south and north. This district embraces approximately 100 blocks. Other portions of the city where traffic is heavy are also attended to at once. After these districts are cleared, attention is given to other streets.

In cleaning the streets following the snow of the twelfth of February, the Street Department used five road scrapers to shove the snow to one side. The two asphalt trucks of the street department were used to cart snow, and, according to the officials, these trucks proved very satisfactory. It was apparent on the night of the twelfth that the snow would be a heavy one and a force of men worked through the night sharpening the shoes of the horses of the Street Department. As early as 5 a. m. the organization was getting together. Each man knew where he was to report, to which dump the snow in his district was to be hauled and how many teams were assigned to his district.

The street cleaning and garbage collection divisions practically were shut down and the employees used in removing the snow. On the second day following a heavy snow, as a rule, the organization is working well and the number of men and teams is doubled. Extra teams and laborers are hired, the extra teams being supplied with identification tags which are attached to the harness. In this way the inspectors or superintendents may readily distinguish between the department teams and those hired for the occasion. A very

close watch is kept to see that each team does its share of the work.

The block system men, three hundred in number, are used to clean the crossings and to open gutters.

J. L. Laxton, engineer in the street department, has prepared statistics covering the removal of the fifteen-inch snow of February 12. They show a total of 23,876 loads were handled. The approximate cost of handling the snow of February 12, 1914, follows:

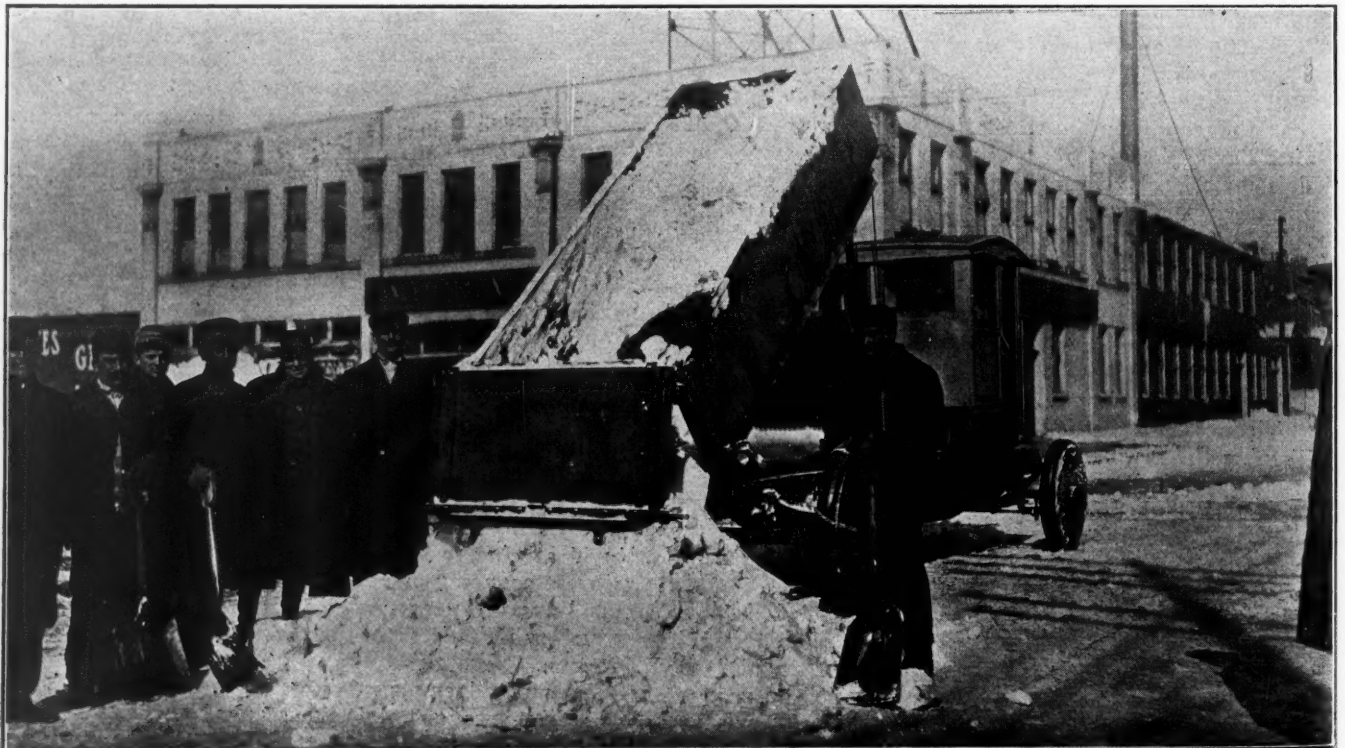
Street Cleaning and Garbage Divisions:	
1,598 teams at \$4.00	\$6,392.00
3,248 men at \$1.50	4,872.00
1 superintendent, 5 days at \$200 per month....	33.33
3 assistants for five days	56.00
5 district superintendents, 5 days at \$85 per mo.	71.00
8 foremen at \$2.00 a day—5 days	80.00
Asphalt Division:	
7 inspectors, 5 days at \$75 per month.....	87.50
Reconstructed Streets Division:	
2 inspectors, 4 days at \$75 per month.....	20.00
5 inspectors, 4 days at \$100 per month	67.00
Sidewalk Division:	
3 inspectors 3 days at \$75 per month	22.50
Sprinkling Division:	
7 inspectors, 3 days at \$75 per month.....	52.50
Construction Division:	
16 inspectors 4 days at \$75 per month.....	160.00
5 inspectors 4 days at \$60 per month.....	40.00
Office of Asst. St. Commissioner:	
4 inspectors 5 days at \$100 per month.....	67.00
Sewer Department:	
Inspectors 5 days.....	140.50
174 laborers 5 days at \$1.50 a day.....	1,305.00
841 teams at \$4.00.....	3,364.00
Total.....	\$16,830.33

There were 23,876 loads, therefore the cost per load was \$0.705.

The above total of \$16,830.33 includes the salary of 1,205 block system men who merely scraped the crossings and opened gutters. These salaries amounted to \$1,807.50.

The extra expense for the removal of the snow, in addition to the regular payroll, is as follows:

976 hired teams at \$4.00	\$3,904.00
1,309 men at \$1.50	1,963.50
	\$5,867.50



ST. LOUIS MUNICIPAL AUTOMOBILE ASPHALT TRUCK USED FOR HAULING SNOW.

MOTOR VS. HORSE APPARATUS IN TRENTON.

The director of safety of Trenton, N. J., George B. La Barre, in his latest report made a comparison of the cost of motor fire apparatus as compared with horse, giving, however, only the operating and maintenance costs, with no allowance for the relative purchase costs in the form of interest and depreciation. His statements are as follows:

During 1906-7 the cost of maintaining a horse-drawn buggy for the chief was \$325.91, while the automobile for the chief during the year 1911-12 after it had been in service for five years, was but \$246.77. This amount was divided up as follows:

Gasoline and oil.....	\$84.29
New parts and repairs.....	68.91
Tires and tubes.....	93.57

The cost to maintain horse-driven chemical No. 1 during the year 1905-6 was \$401.49, while auto-chemical No. 1 during 1911-12, after it had been in service, cost but \$255.60, the amounts being divided as follows:

Gasoline and oil.....	\$110.98
Repairs and new parts.....	93.37
Tires and tubes.....	51.25

Total\$255.60

In the maintaining of automobile engines in preference to the horse-drawn engine there is a saving of over \$600 a year. The cost of keeping the engine of Company No. 1 for one year, 1908-9, being \$893.44, while the cost of the auto engine which replaced this apparatus was but \$247.77 from September, 1910, to September, 1911. The expenses were divided as follows: Gasoline, oil, etc., \$109.52; new parts and repairs, \$31.80, and tires and tubes, \$106.45.

In order that a comparison might be made between the auto engine of Company No. 1 and the horse-drawn engine of Company No. 2 the following estimate of cost of keeping the two pieces of apparatus has been compiled for the year ending March 1, 1913:

Engine Company No. 1 (Auto).

Special fittings and repairs (repairs made by department mechanics, 60c. per hour).....	\$137.87
Gasoline	71.25
Grease	1.60
Acetylene gas	4.00
Oil	14.00
Polish	4.00
Sponges	2.40
Chamois	3.00
Waste	3.20
Total	\$241.32

Engine Company No. 2.

(Consisting of steam fire engine and tender with four horses.)	
Feed, hay, shoeing, peat moss, etc.....	\$693.86
Machinery account, repairs and new parts and engine heater coal.....	307.00
Kerosene, waste, oil, axel grease, etc.....	21.55
	\$1,022.41
Two new horses.....	590.00

Total\$1,612.41

As the auto truck has not been in commission for a year, no detail account of its cost is available; but the expense of maintaining Truck No. 1 (three-horse hitch) which it replaced was \$1,015.83 during 1911-12. Of this amount, \$64.79 was spent for repairs and new parts.

During that year, \$241.32 was spent on the auto apparatus, and \$1,022.41 was needed to maintain a steam engine and hose wagon belonging to Company No. 2. Besides this, \$590 was spent for two new horses for the company, four horses being kept during the year.

STREET WORK IN LA CROSSE**Cleaning Brick and Wood Block Pavements—Hand Sweeping Preferred to Machine—Snow Removal—Street Sprinkling and Oiling.**

In his annual report for the year 1913, George Falk, commissioner of public highways of the city of La Crosse, Wis., gives in abstract the cost of the various activities of his department during the year. Brick and creosote block paved streets and alleys were swept by both hand and machine, and one horse was used with a wagon for collecting the sweepings. The total cost for the year was \$3,739, for which 165,641 square yards of pavement, located mostly in the business district, were cleaned two or three times per day, the average cost per cleaning per great square being 14.4 cents. Some thirty waste cans on the principal corners did much toward keeping the streets clean and reducing the cost of sweeping, the cans being emptied about three times a week. The expense in connection with these cans, as well as all others, is included in the cost given, the wages of the men employed being 20 cents per hour and those of the teams 45 cents per hour. From the figures which he has tabulated of work done by hand sweeping and by machine he finds that the former is cheaper and he believes it also to be more sanitary than machine sweeping.

Macadam streets, of which 637,928 square yards were covered, were cleaned only two or three times a year. The men employed in this work all use long-handled iron snow shovels which, being wider than narrow shovels, cover the ground more rapidly, while the long handle enables the men to work in a more erect position and with less fatigue to the back. The department also operates a scraping machine which throws the dirt into windrows in the gutter and which has given excellent results. Self-dumping wagons are used for carting away the street dirt. The cost of this work last year was \$2,410.

For removing snow from corners and all street and alley crossings and spreading sand on slippery places the city was divided into beats, averaging about twenty blocks to one beat, with two men to each beat, which is increased to four men in case of a very heavy snowfall. These are able to do all of this cleaning in about one day. After a heavy snow or much drifting, the snow plow is used in the outlying districts for the benefit of school children, letter carriers, etc.

The department owns the carts used for street sprinkling and hires teams and drivers at 45 cents per hour, this method having been found to be cheaper and more satisfactory than the contract system. Last year four tank cars of No. 5 road oil were used on macadam streets, 31,704 gallons being bought at 4½ cents a gallon, and the labor of preparing the streets and spreading the oil having cost \$200. The oil was spread by two old sprinkling carts which were converted into oil sprayers at a cost of \$72 each. For heating the oil in the tank car an old steamer was used, which also operated a rotary pump which pumped the oil from tank to cart. The heating of the oil usually took about eight hours, and a cart was filled by the pump in from 5 to 8 minutes. Loading by gravity had formerly required 10 to 15 minutes. By the method employed a tank car of 8,000 gallons was unloaded and spread upon the streets in from three to five hours with the use of two sprinklers. An additional advantage of the pump is that the tank car can be unloaded on any siding most convenient to the streets to be oiled, whereas when unloading by gravity this was possible at one point only.

Mr. Falk considers that the work done by his department has been performed at very low cost, which is to some extent accounted for by the use of labor-saving tools (several of which were described in Municipal Journal of September 28, October 12 and December 21, 1910). In keeping the records of the department a sheet is used in which a line is used for each day, the quantities being totaled at the right hand end of the line, while a vertical column is given to each item and the items for the month totaled by adding the columns. There are nine general column headings, and under each general heading are the sub-headings: men, hours; teams, hours; cost. The general headings are: Cleaning brick pavement by hand; Repairing brick pavement; Repairing macadam pavement; Repairing unimproved streets and alleys; Repairing sidewalks, aprons, boulevards, bulletin boards, signs, standpipes, sprinklers, etc.; Cleaning macadam streets; Cleaning brick pavement by machine; Sprinkling, or removing snow from street crossings, alley crossings and corners; Miscellaneous.

REFUSE DISPOSAL AND STREET CLEANING.

The accompanying tables give data concerning refuse collection and disposal and street cleaning which have been received since the publication of the similar but much more extensive tables in our issue of November 6, 1913.

In addition to these data, the following information was given: Lynn, Mass., sells to farmers as much as possible of the garbage collected; the rest is dumped at sea. The ashes and rubbish are dumped on low land in different parts of the city.

In Asbury Park, N. J., the garbage is cooked, the grease extracted and the residue fed to hogs. Ashes are placed on the streets. Rubbish is culled and burned or used for filling low lands.

Spokane, Wash., burns garbage and rubbish in a Decarie incinerator. Ashes are dumped in low places.

In collecting garbage, Asbury Park uses steel-bodied wagons, some of 29 and others of 50 cubic feet capacity.

(Continued on page 363.)

REFUSE COLLECTION IN AMERICAN CITIES. TABLE NO. I.

City.	Population collected from.	Garbage		Average Daily Quantity of Refuse		Rubbish		Collected by city or contract?
		Summer.	Winter.	Summer.	Winter.	Summer.	Winter.	
Illinois:								
Chicago	2,307,640	475 T.	300 T.	3,500 cu. yds. a	5,750 cu. yds. a			city
Quincy	28,000	5 T.	3 T.					city
Louisiana:								
New Orleans	373,000	229.9 T. d	229.9 T. d					city
Massachusetts:								
Lynn	89,336	35.5 T.	35.5 T.	208 cu. yds. a				city
Nebraska:								
Omaha	135,000	75 T.	50 T.					city
New Hampshire:								
Dover	13,621					12 T.	18 T.	city
New Jersey:								
Asbury Park								contract
North Dakota:								
Grand Forks	13,000	12 cu. yds.	6 cu. yds.					city
Pennsylvania:								
Farrell	12,000	1 cu. yd.	1 cu. yd.			2 cu. yds.	2 cu. yds.	contract
Philadelphia	1,500,000							contract
Rhode Island:								
Pawtucket	55,000	16 T.	11 T.					contract
Tennessee:								
Knoxville	38,000	105 T. d	112 T. d					city
Texas:								
San Angelo								contract
Washington:								
Spokane		12.96 T.	11.06 T.	45 cu. yds.	92 cu. yds.	6.06 T.	2.8 T.	city

REFUSE COLLECTION. TABLE NO. II.

City.	House cans—		Is garbage required to be drained or wrapped in paper.	Average length of haul, miles.		
	Size and type.	Taken from and left by collector.		Garbage.	Ashes.	Rubbish.
Illinois:						
Chicago	5-10 gal. garbage; 15-30 gal. ashes.	Alley gate or front walk.	No.			
Quincy	10 gallons.	Residence.	No.	2		
Louisiana:						
New Orleans	Tight, covered.	Front of residence.	No.	1½ d		
Massachusetts:						
Lynn		Back yard.	No.	1½	1½ a	
Nebraska:						
Omaha	20-gal. galvanized.	Alley.	Drained.	3-5		
New Hampshire:						
Dover		Gutter.				¾
New Jersey:						
Asbury Park	Galv., tight cover, 5 gal. +	Accessible place.	Drained.	2½	½	½
North Dakota:						
Grand Forks	Covered.	Alley.	Yes; both.	4	1	1
Pennsylvania:						
Farrell		Rear of lot.	No.	2		1
Philadelphia	Covered, metal; lim-ited to 1 bu. per day.	Ashes, sidewalk; garbage, accessible place on premises.	No.	3, easy grades	2½, easy grades	
Rhode Island:						
Pawtucket		Back yard.	No.			
Tennessee:						
Knoxville	5 bushels, galv.	Near street or alley.	No.	1, 5% grade		
Texas:						
San Angelo				3		
Washington:						
Spokane	30-gal. galv., tight cover.	Anywhere.	Requested.	2	¾	2

a—includes rubbish. d—includes ashes and rubbish.

REFUSE COLLECTION. TABLE NO. III.

City.	Number of Wagons Used						Number of Men Employed					
	Garbage.	Summer Ashes.	Rubbish.	Garbage.	Winter Ashes.	Rubbish.	Garbage.	Summer Ashes.	Rubbish.	Garbage.	Winter Ashes.	Rubbish.
California:												
Oakland	80	..	..	..	..	..	160	..	..	..	..	..
Illinois:												
Quincy	5	..	..	4	..	..	5	..	..	4	..	..
Chicago	180	350 a	..	150	575 a	..	90	150 a	..	75	225 a	..
Louisiana:												
New Orleans....	130 d	..	..	130 d	..	..	130 d	..	..	130 d	..	..
Massachusetts:												
Lynn	14	11 a	..	14	16 a	..	..	..	..	..	..	..
Nebraska:												
Omaha	28	..	..	18	..	..	28	..	..	18	..	..
New Hampshire:												
Dover .....	..	..	1	..	..	1	..	..	2	..	..	2
North Dakota:												
Grand Forks....	3	..	..	3	..	..	3	..	..	3	..	..
Pennsylvania:												
Farrell	1	..	..	1	..	..	2	..	..	2	..	..
Rhode Island:												
Pawtucket	6	..	..	5	..	..	12	..	..	10	..	..
Tennessee:												
Knoxville	26 d	..	..	26 d	..	..	30 d	..	..	30 d	..	..
Texas:												
San Angelo	2	..	1	2	..	1	2	..	1	2	..	1
Washington:												
Spokane	7	7	3	7	14	2	13	12	6	13	20	4

REFUSE COLLECTION. TABLE NO. IV.

City.	Number of Collections per Week												Cost of Collection*		
	Garbage			Ashes			Rubbish						Garbage	Ashes	Rubbish
	Summer	Winter		Summer	Winter		Summer	Winter		Summer	Winter				
	Business	Residential	Outlying	Business	Residential	Outlying	Business	Residential	Outlying	Business	Residential	Outlying			
California:															
Oakland	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Illinois:															
Chicago	6	3	2	6	2	1	6a	2a	1a	6a	3a	2a	..	\$3.94h	\$0.639a
Quincy	2	1	1	1	1	1	..	..	..	..	..	..	..	..	..
Louisiana:															
New Orleans....	6	6	6	6	6	6	1a	1a	1a	1a	1a	1a	..	1.25d	..
Massachusetts:															
Leominster....	..	..	..	..	..	..	..	..	..	..	..	..	..	1,200.00	..
Lynn	6	1 & 2	1	6	1	1	1a	1a	1a	1a	1a	1a	..	2.50	.23ba
Nebraska:															
Omaha	6	2	2	1	1	1	..	..	..	..	..	..	..	1.55	..
New Hampshire:															
Dover .....	..	..	..	..	..	..	..	..	..	2	1	..	2	1	0.42
New Jersey:															
Asbury Park..	6	6	6	3	3	3	1	1	1	1	1	1	6	6	2.37
North Dakota:															
Grand Forks...	3	2	1	3	2	1	..	..	..	..	..	..	..	1.75	1.00
Oklahoma:															
Chickasha .....	..	..	..	..	..	..	..	..	..	..	..	..	..	2,700.00d	..
Pennsylvania:															
Farrell	2	1	1/2	2	1	1/2	..	..	..	..	..	..	2	1	3.25
Philadelphia...	6	6	6	6	6	6	1	1	1	1	1	1	1	1	2.00h
Rhode Island:															
Pawtucket	3	3	..	2	2	..	..	..	..	..	..	..	..	3,800.00	..
Tennessee:															
Knoxville ...	6d	3d	2d	6d	3d	2d	..	..	..	..	..	..	..	.32d	..
Washington:															
Spokane	6	3	1	6	3	1	6	2	1	6	3	1	6	1	3.29

*—Per ton, or total annual expenditure. a—Includes rubbish. b—Per cubic yard. d—Includes ashes and rubbish. h—Per ton, including disposal.

TOTAL ANNUAL EXPENDITURES FOR STREET CLEANING.

City.	Salaries and wages.	New appliances.	Repairing and maintaining appliances.	Other expenses.
California:				
Oakland	\$19,612	..	\$676	\$41,346
Colorado:				
Colorado Springs..	4,768	..	..	..
Trinidad	5,340a	..	..	..
Michigan:				
Kalamazoo	12,000	..	500	..
New York:				
Ogdensburg	3,625	\$1,300	150	..
North Dakota:				
Grand Forks.....	..	..	250	..
Oklahoma:				
Chickasha	625	..	..	25
Enid	775	..	..	100
Oregon:				
Portland	191,721	..	19,507	40,815
Rhode Island:				
Pawtucket	11,284	..	..	358
Texas:				
Dallas	6,644b	..	..	108,000
Beaumont	1,872	..	..	..
San Angelo.....	..	300	..	100
West Virginia:				
Bluefield	93	25	..	20

a—Contract price. b—Total cost.

STREET CLEANING IN AMERICAN CITIES.

By Hand Sweeping Only.

City	Miles of streets	Areas subject to cleaning; sq. yds.				Amount of cleaning done per week; sq. yds.			
		Smooth	Rough	Macadam	Total	Smooth	Rough	Macadam	Total
California:									
Oakland	35g	.....	.....	.....	174,172	.....	.....	.....	1,970,064
Iowa:									
Des Moines.....	...	.....	.....	.....	.....	.....	.....	.....	.....
Michigan:									
Kalamazoo	22h	81,000	.....	.....	.....	609,000	.....	.....	.....
New York:									
Ogdensburg .....	...	7,000	.....	40,000	.....	.....	.....	.....	.....
Nebraska:									
Lincoln	50	.....	.....	.....	142,000	.....	.....	.....	852,000
Oregon:									
Portland	1,199	128,000	.....	.....	.....	3,072,000	.....	.....	.....
Pennsylvania:									
Du Bois.....	...	7,000	.....	.....	.....	4,200	.....	.....	.....
Farrell .....	...	70,000	.....	.....	.....	70,000	.....	.....	.....
Wilkes-Barre	38h	.....	.....	.....	221,500	.....	.....	.....	1,071,400
Texas:									
Dallas	330	61 mi	.....	.....	.....	61 mi	.....	.....	.....

By Machine Sweeping Only.

California:									
Oakland	35g	.....	.....	.....	897,475	.....	.....	.....	3,491,600
Iowa:									
Des Moines.....	...	.....	.....	.....	.....	.....	.....	.....	207,656
Michigan:									
Kalamazoo	22h	472,523	.....	.....	.....	668,889	.....	.....	.....
Nebraska:									
Lincoln	50	.....	.....	.....	912,000	.....	.....	.....	320,000
North Dakota:									
Grand Forks	56	200,000	.....	.....	.....	.....	.....	.....	.....
Oklahoma:									
Chickasha	65	50,150	.....	.....	.....	309,900	.....	.....	.....
Enid	22h	42,500	.....	.....	.....	85,000	.....	.....	.....
Pennsylvania:									
Farrell .....	...	70,000	.....	.....	.....	70,000	.....	.....	.....
Wilkes-Barre	38h	.....	.....	.....	441,200	.....	.....	.....	1,092,700
Texas:									
San Angelo.....	...	80,000	.....	.....	.....	240,000	.....	.....	.....

By Flushing Only.

Iowa:									
Des Moines .....	...	.....	.....	.....	.....	672	.....	.....	.....
Louisiana:									
New Orleans.....	284.7h	.....	.....	.....	.....	740,456	.....	.....	.....
New York:									
Ogdensburg .....	...	.....	.....	.....	7,000	.....	.....	.....	.....
Oklahoma:									
Enid	50	42,500	.....	.....	.....	255,000	.....	.....	.....
Pennsylvania:									
Wilkes-Barre	38h	.....	.....	.....	615,800	.....	.....	.....	779,100
Tennessee:									
Knoxville	90	575,000	.....	.....	.....	.....	.....	.....	.....

By Both Hand and Machine Sweeping.

Colorado:									
Colorado Springs.....	125	57,000	12,000	.....	69,000	.....	.....	.....	.....
Trinidad .....	...	100,000	.....	.....	.....	.....	.....	.....	.....
Louisiana:									
New Orleans.....	284.7h	.....	.....	.....	.....	4,841,000	858,494	.....	.....
North Dakota:									
Grand Forks	56	60,000	.....	.....	.....	.....	.....	.....	.....
Pennsylvania:									
Farrell .....	...	70,000	.....	.....	.....	.....	.....	.....	.....
Philadelphia	1,331g	.....	.....	.....	17,059,545	.....	.....	.....	49,109,922
West Virginia:									
Bluefield	50	.....	.....	.....	.....	.....	.....	.....	.....

By Both Sweeping and Flushing.

Oklahoma:									
Stillwater .....	...	14,000	.....	.....	.....	.....	.....	.....	.....
Oregon:									
Portland	1,199	.....	.....	.....	6,272,640	.....	.....	.....	7,603,200

g—Cleaned. h—Paved.

STREET CLEANING IN AMERICAN CITIES. Continued.

City	By Hand Sweeping Only.				Weeks in the cleaning season.				Number of cleanings per week.			
	Quantity of street sweepings removed per week; cu. yds.											
	Smooth	Rough	Macadam	Total	Smooth	Rough	Macadam	Total	Smooth	Rough	Macadam	Total
California:												
Oakland				94				52				12
Iowa:												
Des Moines				138								
Michigan:												
Kalamazoo									6			
New York:												
Ogdensburg									6			
Nebraska:												
Lincoln				84				32				6
Oregon:												
Portland	24				52				24			
Pennsylvania:												
Du Bois					16				6			
Farrell	15				50				1			
Wilkes-Barre								52				1, 3 & 6
Texas:												
Dallas	100				52				6			
By Machine Sweeping Only.												
California:												
Oakland								52				2-6
Iowa:												
Des Moines				97								
Michigan:												
Kalamazoo									1 & 2			
Nebraska:												
Lincoln				144				32				
North Dakota:												
Grand Forks					30				2 & 3			
Oklahoma:												
Chickasha	15				52				6			
Enid					52				2 & 6			
Pennsylvania:												
Farrell					26				1			
Wilkes-Barre								35				1½-5
Texas:												
San Angelo	42								2 & 4			
By Flushing Only.												
Iowa:												
Des Moines	67.6											
Louisiana:												
New Orleans												
New York:												
Ogdensburg								30				3
Oklahoma:												
Enid					30				6			
Pennsylvania:												
Wilkes-Barre								35				½-3
Tennessee:												
Knoxville									3-1			
By Both Hand and Machine Sweeping.												
Colorado:												
Colorado Springs	50	25		75	52	52			14	7		21
Trinidad					53				7			
Louisiana:												
New Orleans												
North Dakota:												
Grand Forks					35							
Pennsylvania:												
Farrell	15				35				1			1 to 6
Philadelphia												
West Virginia:												
Bluefield	50				40							
By Both Sweeping and Flushing.												
Oklahoma:												
Stillwater									¼			
Oregon:												
Portland				1,300				52				7-¼

(Continued from page 360.)

For ashes, 2-horse, 3 cubic yard wooden body dump wagons are used; and for rubbish wooden racks give a capacity of about 6.5 cubic yards. Canvas covers are used. Garbage wagons are washed each day and rinsed after each load.

Spokane uses for garbage a 2-horse tank wagon, lined

with steel, tightly covered, not dumping, 100 cubic feet capacity. For ashes, an Eagle special design wagon, bottom dump, 3 cubic yards, 2-horse, is used. For rubbish a 2-horse non-dumping wagon, bottom dump, 3½ cubic yards capacity is used. The ash and rubbish wagons are not covered. The garbage wagons are washed every night with cold water under 65 pounds pressure.

STREET CLEANING EMPLOYEES.

City	Sq. yds. cleaned per week	Hand Sweeping					Sq. yds. cleaned per week	Fore- men and in- spectors	Machine sweeping				
		Fore- men and in- spectors	Mechanics and other skilled laborers	Teams	Un- skilled laborers	All others			Mechanics and other skilled laborers	Teams	Unskilled laborers	All others	
California:													
Oakland	1,970,064	½	.....	1-1/6	23	.....	3,491,600	½	.....	f	.....	.....	.....
Colorado:													
Colorado Springs..	.....	1	.....	2	6	.....	.....	1	.....	1	1	.....	.....
Massachusetts:													
Leominster .....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
Lynn .....	.....	1	.....	2	18	.....	.....	.....	.....	2	18	.....	.....
Michigan:													
Kalamazoo	609,000	1	.....	1	6	.....	668,389	1	.....	5	8	.....	.....
Nebraska:													
Lincoln	852,000	.....	.....	2	16	.....	320,000	1	.....	5	11	.....	.....
New York:													
Ogdensburg .....	.....	1	.....	1	2	.....	.....	1	.....	1	1	.....	.....
North Dakota:													
Grand Forks.....	.....	1	.....	1	5	.....	.....	1	.....	2	.....	.....	.....
Oklahoma:													
Chickasha .....	.....	.....	.....	.....	.....	.....	300,900	.....	.....	1	.....	.....	.....
Enid .....	.....	.....	.....	.....	.....	.....	85,000	2	.....	1	1	.....	.....
Oregon:													
Portland	3,072,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania:													
Du Bois	4,200	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....
Farrell	70,000	2	.....	2	8	.....	70,000	2	.....	2	6	.....	.....
Rhode Island:													
Pawtucket .....	.....	2	.....	6	23	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee:													
Knoxville .....	.....	1	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	.....
Texas:													
Dallas .....	.....	1	.....	.....	75	.....	.....	1	.....	4	4	.....	.....
San Angelo.....	.....	.....	.....	.....	.....	.....	240,000	.....	.....	1	1	.....	.....
West Virginia:													
Bluefield .....	.....	.....	3	1	.....	.....	.....	.....	1	1	.....	.....	.....

f—Done by contract, no record.

STREET CLEANING EMPLOYEES. Continued.

City	Sq. yds. cleaned per week	Flushing				Sq. yds. cleaned per week	Total on Street Cleaning				
		Fore- men and in- spectors	Mechanics and other skilled laborers	Teams	Un- skilled laborers		All others	Fore- men and in- spectors	Mechanics and other skilled laborers	Teams	Unskilled laborers	All others
California:											
Oakland	5,461,664	1	.....	1-1/6	23	.....
Colorado:											
Colorado Springs.....	1	.....	3	7	.....
Massachusetts:											
Leominster
Lynn	1	.....	2	18	.....
Michigan:											
Kalamazoo	1,277,389	2	.....	6	14	.....
Nebraska:											
Lincoln	2	.....	7	27	.....
New York:											
Ogdensburg	1	3	.....	2	.....	2	6	.....
North Dakota:											
Grand Forks.....	1	1	2	.....	.....	1	1	3	7	.....
Oklahoma:											
Chickasha	300,900	.....	.....	1	.....	.....
Enid	255,000	2	.....	.....	.....	340,000	2	.....	3	3	.....
Oregon:											
Portland	10,675,200	3	.....	170g	195	.....
Pennsylvania:											
Du Bois	1	6	.....	.....	.....	2	8	.....
Farrell	2	.....	.....	.....	.....
Rhode Island:											
Pawtucket
Tennessee:											
Knoxville	1	.....	5	.....	.....	2	.....	5	11	.....
Texas:											
Dallas	6	6	2	10	85
San Angelo.....	2	2
West Virginia:											
Bluefield	4	2

g—Also two 5-ton trucks.

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MARCH 12, 1914.

CONTENTS

Paterson Refuse Disposal Plant. (Illustrated).....	353
Snow Removal in New York.....	355
Extinguishing Fires with Sawdust. By E. A. Barrier.....	356
Snow Removal in St. Louis. (Illustrated). By H. M. Crutcher	357
Street Work in La Crosse	359
Refusal Disposal and Street Cleaning: Tables.....	360
Profit from Garbage and Sewage.....	365
Snow Removal.....	365
The Municipal Bond Market.....	365
Municipal News. (Illustrated).	366
Legal News—Notes of Recent Decisions.....	372
Municipal Index	373
News of the Societies.....	376
Personals	377
New Appliances. (Illustrated).....	378
Industrial News	380
Contract News	382

Profit from Garbage and Sewage.

The idea of making a profit in connection with the disposal of garbage and sewage is by no means new. Twenty-five years ago the English patent office had granted more than one hundred patents for processes or apparatus which claimed to secure this result; but so far, we believe, there is not a single sewage plant which does so. There are, however, a few garbage reduction and incinerating plants which are apparently earning a profit—probably a very good profit—for the companies which operate them.

A few weeks ago we published a description of a process which we believe is to be tried on a large scale for making producer gas from sewage sludge, besides recovering grease and possibly other materials. This particular process may or may not prove a financial success (there is probably little question that it is physically practicable), but it appears to be at least possible that before long a process will be evolved which, under favorable circumstances, will be commercially successful. But, meantime, we would warn city officials against giving too credulous an ear to unprincipled or impractical advocates of such schemes. No city should sink money in such an enterprise until they have been assured by unprejudiced and competent experts that it is a practical one.

We have recently learned of a process which is being exploited by which it is claimed that denatured alcohol,

acetic acid, grease, lubricating oil, roofing tar, potash, solder and tin (from tin cans), water gas, etc., are to be obtained from sewage and garbage at a "big profit." Probably these can all be obtained in the laboratory, but there is a long step—and a mighty difficult one—between laboratory tests on a few gallons of sewage and a bucketful of garbage, and the practical treating of millions of gallons of the former and hundreds of tons of the latter daily, every day, and at a cost which will yield a profit.

Snow Removal.

Another municipal problem which attracts the inventor is snow removal; but the fact that it would be used only two or three times a year on the average is a weighty argument with cities against investing in expensive machinery designed especially for this purpose; and we believe no city has adopted any special contrivances for handling snow other than plows. (Street railways, of course, make use of large revolving brooms for final cleaning.) The practice of St. Louis, described elsewhere, is that of most cities which make any effort to remove snow—hand-shoveling into dump-carts or trucks, with steel horse scrapers for throwing the snow into long piles for convenient removal.

The difficulty of the problem lies in the enormous amounts to be handled by emergency forces. New York will have removed about four million cubic yards and spent about two million dollars in doing so before its main thoroughfares are snowless. Incidentally, the amount already removed is about forty-five times as much as was removed after the "blizzard of '88," which indicates how much more exacting we are becoming in this matter.

There is one alternative to dumping snow in rivers or vacant lots or parks which is used in several cities—dumping into sewers. New York this year has disposed in this way of at least one-third of the snow removed, 155 manholes having been designated for this purpose. Into some of these the snow is dumped from carts; into others it is scraped with panning scrapers from the adjacent pavement. As the temperature of the sewage runs about 70 degrees, the snow melts rapidly if the sewage flow is not entirely blocked. The chief objection to this practice is the amount of dirt and refuse which is generally dumped with the snow and may clog the sewer. Of course, only storm sewers can generally be used for this purpose.

The Municipal Bond Market.

In our issue of December 25, 1913, we called attention to the apparently favorable conditions of the market for municipal bonds during the first three months of this year. The demand for municipal bonds which was there prophesied has materialized, and during January and February of this year, according to the "Bond Buyer," permanent municipal bonds were sold to the amount of \$110,466,286, or nearly twice as much as during the corresponding months of either 1913 or 1912. This does not tell the entire, nor, in fact, the most important, feature of the market, however, which was a decided rise in price of municipal bonds, "which amounted," says the paper referred to, "in some cases to as much as three points over the quotations for similar bonds a year or half a year ago. This improvement * * * has progressed to such an extent that one of the biggest institutional investors in municipals has decided that prices for long-term issues were too high; and this concern will now purchase only short-term bonds. There is a strong demand for these tax-exempt issues, and we are not inclined to agree exactly with the institution referred to."

The WEEK'S NEWS

Philadelphia Plans Sewage Disposal Plants—Perth Amboy (N. J.) to Extend Water Supply—Will Import More Electricity from Canada—Hartford's Auditorium Fire—Bloomfield (N. J.) Will Make Departmental Survey—Denver to Build Great Railway Tunnel—Mayors Will Tour Europe.

ROADS AND PAVEMENTS

Extensive Highway Planned by Utah and Colorado.

Colorado Springs, Colo.—Utah will develop its link of a great transcontinental highway to connect with Colorado, and will give its active co-operation to the Pike's Peak Ocean-to-Ocean Highway Association. At a meeting in Provo, Utah, the Utah division of the Pike's Peak Ocean-to-Ocean Highway Association was definitely organized for the purpose of developing and promoting the section of the highway across that state and of co-operating in a permanent way with the highway across Colorado. Ever since plans for a transcontinental route through Colorado began to take definite shape two or three years ago, one of the greatest problems has been that of securing a western outlet. When the National Lincoln Highway Memorial Association selected its route through Wyoming, it became evident that unless Colorado established a great highway and secured proper connections both west and east, it would not receive its share of the transcontinental auto travel that will develop in 1915.

Commission Will Buy Cement for Roads.

Chicago, Ill.—The state highway commission will purchase all the cement used to build "Illinois state aid roads." The members, after reaching this conclusion, sent letters to cement companies asking for bids. The commission, by buying cement at the lowest possible cost consistent with good quality, will give the small contractor an equal chance with the big operator in road building. Cook county's allotment of \$120,000 from the state aid fund was officially turned over to the county board by the commission. This, together with the \$120,320 appropriated by the county board for roads to meet the requirement of the state aid and the \$80,000 appropriated for use of the roads and bridges committee constitutes a total of \$320,320 that will be spent for good roads in Cook county this year.

Steam Railway for Road Building.

Wayne, Ind.—It is reported that County Road Commissioner J. S. Haggerty will ask for a diminutive steam railway system, to be used for hauling road-building materials. Mr. Haggerty says the railway, which would cost about \$20,000, would pay for itself within a year. The system, according to plans adopted by the board, is to include a 30-horse power locomotive and 26 cars, each with a capacity of one and a half cubic yards. The railroad will be built so that it can be moved from one portion of the county to another when necessary. The plans call for seven miles of rails.

Heavy Hauling Prohibited.

Vincennes, Ind.—B. F. Yates, county road superintendent, has given notice to all his assistants to be posted at prominent places to apprise the farmer of the law against hauling heavy loads over the county roads. For the next month heavy hauling will do more to injure the roads than anything else and for this reason the warning note is sounded. Under the law the limit of hauling with a vehicle with three-inch tires is 3,000 pounds, including the driver, and with vehicles with tires three and a half to four inches in width the limit is 3,500 pounds.

City to Compel Sidewalk Improvements.

Burlington, N. J.—Immediate improvement of sidewalks through the city, a reform that has encountered innumerable delays, is promised by the Street Committee of Council as the result of an ordinance passed under suspended

rules, whereby official grades are established. Where property owners fail to repave the work will be done by the city and the cost assessed against the properties.

Designate County Roads.

Ames, Ia.—The State Highway Commission has taken final action on the establishment of the statewide system of roads. The county road systems in every one of the ninety-nine counties have been designated. From the final action of the commission there is no appeal. The commission has said that the boards of supervisors of the counties must consider certain roads the main roads of their counties, and the commission's decisions are what the boards must follow. Final action was not taken until after a commission committee composed of a commissioner and a commission field engineer had gone over the different road routes where more than one route was sought between points and where there was a difference of opinion as to the best route, and not until the board of supervisors had been interviewed, and any others interested in the designation heard.

Road Drags Show Good Results.

Pittsburg, Kan.—Two road drags, recently purchased by Commissioner Messenger, have been almost in constant use for nearly a week on city streets which were graded last year, and a comparison of the appearance and condition of the streets "before and after" shows a great improvement. The streets that were filled in, graded and otherwise improved, in most cases, were rough on the surface, with ruts and ridges. Those that have been dragged now are even and smooth and in fine condition for traffic. The travel which newly-graded streets have borne has packed the dirt down hard, so that they were just in proper shape for dragging.

Advocate Additional \$50,000 Road Bonds.

Bastrop, Tex.—The committee having in charge the supervision of the expenditure of \$80,000 in building good roads in this justice precinct made a report at a well attended meeting held here recently. The committee reported about forty miles of road completed, with a balance of something over \$2,000 in the treasury. It was suggested, with the hearty approval of all, that an additional bond issue of \$50,000 or more be voted for the purpose of building more roads and constructing two low-water concrete bridges on the Colorado River.

To Hold Good Roads Institute.

Stamford, Tex.—Definite arrangements have been made for the Jones County Road Overseers' institute, which will be held in Anson, March 26 and 27. Prof. R. J. Potts of the Agricultural and Mechanical college will be the conductor of the institute, and on the second day it is intended to build a stretch of road applying the principles outlined by Prof. Potts. The good roads people of the county are showing much interest in the movement, and a very large meeting is expected.

SEWERAGE AND SANITATION

Plan Three Large Disposal Plants.

Philadelphia, Pa.—G. E. Datesman, principal assistant engineer of the bureau of survey, has announced that city engineers are contemplating the disposal of Philadelphia's sewage through three large stations to be built in accord-

ance with systems now in vogue in Germany. The three stations, which will be somewhat similar to the type used on Pennypack Creek, are to be located in the northeast, southeast and southwest sections of the city. In speaking to the Philadelphia Municipal Engineers Association, Mr. Datesman declared that American engineers lack the prejudices of the German and English engineers and can select the best points from the schemes of each. This ability, he said, is exemplified in the disposal plant constructed over a year ago on Pennypack Creek.

Health Bureau to Prosecute Piggeries.

Philadelphia, Pa.—Tired of waiting for a decision of the court in the test case involving the power of the board of health to get rid of the piggeries, Acting Director Wilson, of the department of health, has announced that prosecution will be renewed. Truce between the piggery owners and the city was declared last October, after the test case was heard in common pleas court, pending a decision. It was naturally expected that the court would dispose of the matter within a month or two, or in ample time to provide for the removal of objectionable piggeries before the spring fly-breeding time. Concerning his plans, Director Wilson said:

Although the decision in these cases has not come down, it becomes necessary to take steps at once to abolish piggeries that are outside the limits designated by ordinance of councils. The month of March, with the warm weather that it will bring, will start the breeding of flies. The time is ripe for a vigorous campaign against such piggeries as may be removed with the present power at the disposal of the bureau of health.

Will Eliminate City's Dumps.

New Brunswick, N. J.—The Board of Health promises during the present year to rid the city of all of its dumps which are proving themselves menaces to the health of residents. If it does not fall within the pale of the board's prerogatives to eliminate such nuisances, Attorney G. L. Burton will introduce in the state legislature a bill providing for sufficient means. Not only loose paper is dumped with the ashes, but instances have been shown where even decaying vegetables and meat have been thrown into the dumps. The president of the board, J. A. Morrison, suggested the utilizing of an incinerator to properly dispose of vegetable matter and paper.

Scarlet Fever Invades Cities.

Champaign, Ill.—Mayor Dobbins has ordered all theatres and billiard rooms closed because of fear of scarlet fever. Theatres and public schools in Urbana also have been closed. This action followed a conference with representatives of the State Board of Health. Officials denied that there is any intention of quarantining the two cities.

Typhoid Epidemic.

St. Johns, Quebec.—A serious epidemic of mild typhoid in St. Johns and Iqerville has left its effect upon 2,000 persons out of a population of 7,000. Factories were short handed and business in general suffered.

WATER SUPPLY

Plan Increase of Water Supply.

Perth Amboy, N. J.—This town is contemplating the increase of its water supply by about 5,000,000 gallons per day. Supt. T. Grieve and City Engineer S. Mason have been instructed by the Board of Water Commissioners to prepare data relative to the cost and installation of such apparatus as would give the additional supply. The superintendent at a recent meeting of the board outlined a plan for purchasing a pump and motor, forming a filter basin of the natural filter sand at Runyon, placing in operation one of the artesian wells at that place and aerating the water over the filter bed into the driven storage wells and then pumping it to this city. According to Mr. Grieve it would take two double teams about two months in levelling off and preparing the filter basin of sand, which is to cover about ten acres of land. He thought that the purchase of a five-gallon pump, motor and accessories and the construction of the filter bed could be accomplished at an outlay of about \$4,000.

Repair Filter Beds.

Sanducky, O.—Work of putting in new concrete floors in

the old filter bed basins, to replace alleged faulty construction under the original contractor, has been commenced at the filtration plant. Work on two beds is now under way while the sand has been removed from two others. Reinforced concrete supports, called for in the original plans but never put in, are to be constructed at this time. In all, six filter beds will have to be repaired.

Protest Against Use of Village as Watershed.

Providence, R. I.—This city seems to have gotten into the bad graces of the village of Scituate in its attempt to secure legislation providing for the utilization of a watershed embracing that community. An indignation meeting was held, in which the citizens of Scituate voiced in no uncertain terms their unqualified condemnation of any effort at what was called a "speculative scheme for grabbing homes" which "have been in the same family for many generations." Dr. Clarke, chairman of the meeting, well expressed its sentiment, when he said: "Heretofore we have had only unofficial information as to what the city wants to do, and now that we have got together with this bill and see that it means the practical extinction of our town I propose that we talk it over, and then appoint a committee to act against it. I do not know that there is any way in which this scheme can be stopped, but if there is we should know about it at once and then adopt it."

City Cannot Sell Ice From Water Supply Source.

Boston, Mass.—Any measure granting a city power to cut and sell ice from sources of water supply owned by it would be unconstitutional, according to an opinion received by the Senate from Attorney General Boynton. His opinion had been asked in connection with a bill which sought to give the city of Holyoke the right to engage in the ice business. The Attorney General finds that the test of constitutionality is whether the proposal is a public one, and says that if such business be carried on, the cost must be raised by taxation, and it is settled in this commonwealth "that the Legislature can authorize a city or town to tax its inhabitants only for public purposes."

Water Main Bursts, Causing Gas Explosion.

New York, N. Y.—A series of three great gas explosions, followed by lesser ones, wrecked the entire pavement at Twenty-third street and Fifth avenue on Sunday morning and caused two large breaks in the water mains and partly damaged the sewer. The new subway now being con-



SCENE OF GAS EXPLOSION IN NEW YORK.

structed under Broadway, which intersects Fifth avenue, became badly flooded to a depth of about ten feet. Buildings in the immediate vicinity were seriously threatened, their cellars filling up with water, and many plate glass windows breaking from the shock of the explosion. Six automobile fire engines were rushed to the scene and to pump

away the water gushing from the broken mains. For the entire day traffic in the avenue was suspended. The cause of the explosion, as unofficially declared, was the bursting of a water main, which is said to have undermined the gas pipes. Escaping gas could readily have been ignited by the electric feed wire of the street railway company. In the work of alleviating the flood in the subway, a public service corporation extended the use of two of its Bond's Atlantic pumping engines, while later when electric connections were made two Goulds centrifugal pumps were placed in operation. It required several hours before the water and gas could be shut off, and by that time, it is estimated, about one and a half million gallons of water had escaped.

Inspectors Will Stop Water Waste.

Brooklyn, N. Y.—Alfred W. Booraem, Brooklyn's new deputy water commissioner, has declared that he would shortly put on nineteen extra inspectors in the "water waste" squad. The duty of this squad is to search out leaky faucets and other sources of water waste in the borough and correct them, thereby saving the city considerable expense in supplying and pumping this extra water. The extra inspectors were provided for in the last budget but they have not yet been appointed. The salary is \$1,100 annually.

Use Electrical Device to Thaw Out Pipes.

Huntington, Ind.—For the first time since the cold weather of the winter of 1911-12 employees of the city Waterworks Department found it necessary to put the large electric thawing machine into service. Several water pipes were frozen shut and could not be thawed out by ordinary methods. The machine is a ponderous affair, weighing nearly a ton. It was built two years ago on plans made by Supt. John Futon of the Waterworks Department. The principle of the machine is to obtain high amperage with a low voltage. Parts of the machine are connected with the pipe on either side of the section frozen shut. The current, then turned on, passes along the pipe, and, because of the high amperage, quickly thaws it out.

Basin Repaired.

Nashville, Tenn.—The work of repairing the east basin of the city reservoir and treating it in accordance with plans and specifications prepared by Rudolph Hering, a hydraulic engineer of New York, has been completed and the basin has been tested, cleaned and disinfected with a strong solution of lime. The basin will be filled at the rate of about three million gallons a day, which will necessitate a pumpage of about fifteen million gallons a day, as the average daily consumption of water by the city is about twelve million gallons. During the process of filling the basin, on account of the arrangement of the supply mains, it will be necessary to supply water to the Waverly and Belmont sections of the city direct from the main by which water is conveyed to the reservoir.

STREET LIGHTING AND POWER

Many Georgia Cities Own Light Plants.

Atlanta, Ga.—That 76 cities and towns in Georgia own and operate their electric lighting systems is shown by the figures of the state railroad commission, compiled for the commission's forthcoming annual report. Some buy their current from privately owned producing plants and distribute it through their municipal distributing systems. Most of them, however, own their own producing plants as well as the distributing systems. There are 127 cities and towns of 1,000 population and over which are served by one or more public utility. Of this number, 118 are lighted by electricity.

Wants Wires Put Under Ground.

Camden, N. J.—Mayor Ellis will urge that city council take some action that will result in placing underground all telegraph and telephone wires in the city limit. He will use the late blizzard as one of the reasons for this, as lives of pedestrians were in danger and there was a probability of many fires as the result of crossed wires.

Will Secure More Electricity from Canada.

Albany, N. Y.—The up-state Public Service Commission, under a decision announced recently, has granted permission for the further importation of electrical horse power from Canada. The result, it is expected, will be to cheapen the cost of electrical power to consumers in western New York, particularly the Niagara district.

Mayor Urges Municipal Light Plant.

Houston, Tex.—The annual report to the city of the Houston Light and Power Company, showing that the net earnings of that corporation were \$285,924.55 and that the plant, valued at \$2,911,728.55, was paying taxes on \$1,480,000 caused Mayor Campbell to issue a statement declaring that the time was not far off when Houston would own a municipal plant. The Mayor contends that the rates charged by the company are not at all equitable. As an instance of the greater efficiency and economy of municipally owned utilities he points out Houston's municipal water works, which supply a better quality of water at a lower rate to consumers than was formerly had by the city under a privately owned plant. An expert has been employed to appraise the lighting company's property and to estimate the cost of constructing a municipal plant.

Disagree on Value of Plant.

Denison, Ia.—The appraisal of the electric light plant has come to a deadlock, with Mr. Hill, expert for the city, and Mr. Krabel, expert for the electric light company, far apart on their figures. Nobody knows the exact difference in their figures, but it is said to be \$10,000 or more. A third man has now been called in, Mr. C. W. Humphreys of Chicago, being the third arbiter, and he is summing up the figures and the evidence that the other two have gathered. The chances, it is said, are not good for an early settlement of the matter and there is now no telling when the city will take possession of the present plant.

Will Celebrate "White Way."

Galveston, Tex.—Preparations are being made by the various organizations for public festivities to celebrate the installation of the modern system of electrical lighting on Broadway, which has been completed at a cost of approximately \$18,000. The new lights make of Broadway a second "Great White Way," which will compare favorably with the boulevard.

FIRE AND POLICE

Fire Perils Checked by Inspection.

New York, N. Y.—A month ago Fire Commissioner Adamson ordered a monthly inspection of buildings by members of the uniformed force of the department. The first report has been recently submitted by Chief Kenlon. Between Jan. 26 and Feb. 26, 104,621 inspections were made. In 84,228 cases conditions were found to be good. In 20,333 cases violations were found, and of these 12,645 were remedied at once. Unusually dangerous conditions were found to exist in 1,020 cases, and these were at once referred to the Bureau of Fire Prevention. In some cases it was found that highly inflammable material was stored in houses where dozens of families lived. "The inspection system convinces me," said Commissioner Adamson, "that it was needed, and it will be continued. In one month the firemen have made nearly as many inspections as the Bureau of Fire Prevention made last year. They reported only dangerous conditions. Nearly all the bad conditions they found were corrected by verbal order. I am sure that a few months more of such careful inspection and the fire conditions in this city will be improved greatly."

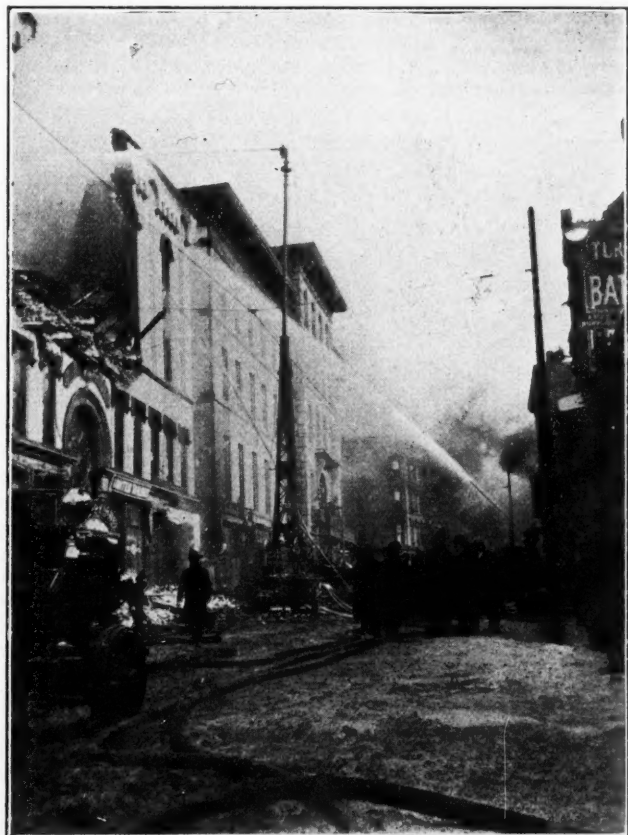
Purchase Smoke Helmet After Demonstration.

Leavenworth, Kan.—A smoke helmet, such as is needed by firemen in entering smoke or gas-filled buildings, will soon be added to the equipment of the local fire department. At the meeting of the city commissioners an order was placed with the Draeger Oxygen Apparatus Company, for such a protector. The price of the helmet is \$125, and

the necessary accessories, such as an extra charged oxygen tank, will bring the total cost up to \$161. A demonstration of the helmet has been given for the benefit of the city officials and Mr. M. Bahler, fire chief. The chief's office was made as air tight as possible and then filled with fumes of formaldehyde. Several firemen were called upon to enter the room but they could stand the fumes only a few seconds. Then the protector was given the test. Two firemen each took a turn, going into the room with the helmet on. They were able to stay in the room for a considerable time.

Auditorium Destroyed in Hartford.

Hartford, Conn.—Hartford's Auditorium was completely destroyed by a fire two weeks ago, causing a loss of \$127,500. The snow, which had accumulated on the thoroughfare, proved a serious obstacle to the passage of the apparatus to the fire. Great difficulty was encountered in getting the water tower to the scene of the fire; seven horses were able to drag the tower from the station only a short distance when it was stalled. Then it was hitched



Courtesy Hartford (Conn.) Times.

WATER TOWER AND TURRET NOZZLE IN OPERATION.

to a trolley car and pulled to a few blocks from the auditorium, when the horses were again brought into use. Firemen were commended on their splendid work under the supervision of Chief Moran. Many received injuries but stuck to their posts until the flames were finally extinguished. The origin of the fire has been traced to the explosion of a gasoline torch used in a trunk shop.

Improve Police Department.

Amsterdam, N. Y.—Commissioner Kaufman, of the Department of Public Safety, has announced that a new cabinet and card system will be placed in headquarters which will contain a record of every article offered for pawn in the city. A new police blotter card system will be installed by which a complete record of every arrest will be kept. A miniature rogues' gallery is planned, with a capacity for 600 photographs.

Must Pay Dual Police Force.

Nashua, N. H.—In an opinion handed down, the supreme court defines the legal situation as to the dual police force in the city of Nashua. The Legislature of 1913 passed an "act to unify police commissions of the state" under

which a new commission was appointed in Nashua which summarily removed from office the old police force. Members of that force, however, claimed that the commission had no authority to make such removal and the police officers continued to report for duty and brought suit against the police commission. The court holds that while the act of 1913 was legally passed it did not repeal the act of 1891 under which the old police officers held their appointments "during good behavior and while competent to discharge the duties of their office." The court holds, therefore, that "the plaintiffs are still the police officers of the city of Nashua." The Nashua city government has refused to pay the salaries of the new officers appointed by the commission and the latter brought suit for their pay. In this case the court holds that the new officers have performed the duties of their positions and are entitled to pay therefor.

Chief Will Answer Only Serious Alarms.

Scranton, Pa.—With the introduction of battalion fire chiefs in the Fire Department will come a new code of signals to be used by the battalion chief in calling for assistance from the chief of the Fire Department. This system will do away with the necessity for the fire chief's wagon at the central station responding to every alarm. It will also make it unnecessary for the flying squad to go to each fire. The battalion chief for each district will be stationed at the fire house where an auto truck or combination is located, and then when an alarm in his district comes in he will ride the auto to the fire, and if he finds that it is too serious for him to handle he will turn in a code alarm to the central fire station which will bring out the flying squad, of which Fire Chief H. F. Ferber is the head.

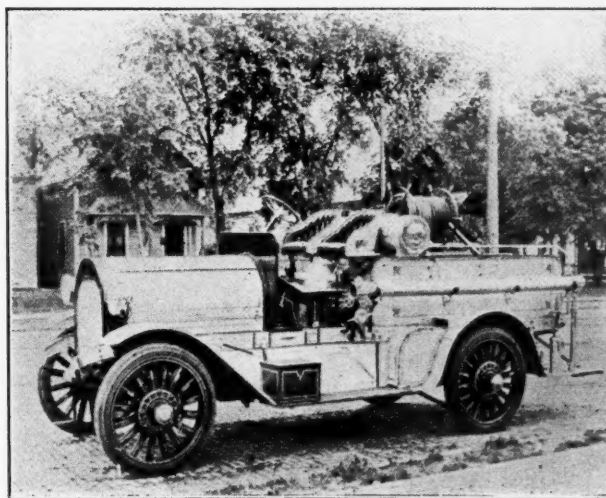
Sanitary Drinking Fountain for Police Station.

Huntington, Ind.—Employees of the water works department have installed a sanitary bubbler drinking fountain in the police station. The contrivance is novel and the first of its kind to be put in service in Huntington. It consists of the usual bubbler on top of the faucet but, turning it on, water can be obtained either through the bubbler or through the faucet.

MOTOR VEHICLES

New Auto Engine Received.

Plainfield, N. J.—At a cost of \$7,800, this city has installed a new Nott Universal pumping engine. The capacity of the pump is 600 gallons per minute. The motor in the new engine is a four-cylinder, 6½-inch bore, with an eight-inch stroke, and develops under brake test 110



Courtesy Plainfield (N. J.) Courier-News.

LATEST MOTOR FIRE APPARATUS IN PLAINFIELD.

horsepower. The pumps are of the improved positive roller rotary type, which the contract specifies must deliver 600 gallons of water per minute, against a net pump pressure of 140 pounds. A test will be made of the engine as soon as the company's representative arrives in Plainfield.

Order Seagrave Truck.

High Point, N. C.—City Council has authorized the purchase of a new combination hose and chemical auto fire truck from the Seagrave Company of Columbus, O. Six other manufacturers submitted bids. Capable of generating as high as 100-horse power, the truck will carry 1,500 feet of hose, a 40-gallon chemical tank, 100 feet of ladder and 250 feet of chemical hose. A speed of 50 miles an hour is guaranteed. The price of the truck was \$5,400, while the hose purchased for it cost \$900.

GOVERNMENT AND FINANCE

Ascertain Cost of Investigating Departments.

Bloomfield, N. J.—To learn the probable cost of an investigation of every municipal department in Bloomfield for a period of five years, which was unanimously decided upon at a recent meeting of the Town Council, members of that body have conferred with two representatives of the Bureau of Municipal Research of New York. It was said the cost would be between \$3,000 and \$4,000. It was explained by the bureau representatives that the plan proposed would necessitate the employment of a financial specialist at a cost of \$30 a day and an assistant at \$15 per day. They did not know just how long it would take to complete the investigation, and recommended that the bureau be authorized to make a preliminary inspection.

Complications Over Bond Issue.

Bristol, Tenn.—Complications have arisen in connection with the new \$100,000 bond issue to be made by Sullivan County, to carry forward the work of grading and macadamizing the public highways. It is claimed by some that the county court can not issue these bonds without the vote of the people under the law passed by the last legislature. Others claim that the bonds were authorized by a special law passed prior to the new law on the subject. The county has issued \$500,000 in road bonds. The first issue of \$100,000 was issued upon a vote of the people, but the two subsequent issues of \$200,000 each were issued directly by the county court and without a vote of the people.

Want Commission Government.

Atlanta, Ga.—Fulton county may have a form of commission government instead of a supervising board and heads of departments if a present plan is worked out. Several members of the present county board are said to favor it. A bill will be presented to the Legislature providing for the change in the event the people of Fulton are willing to try it. It will provide for three active commissioners, who will receive a salary of \$5,000 a year each and who shall do nothing but handle the county's affairs.

Commission Government Elected.

Honey Grove, Tex.—In the election on the commission form the vote stood, for 268, against 76. M. E. Daniels and J. A. Pierce were elected commissioners.

Monett, Mo.—Monett adopted the commission form of government at an election here, the majority in favor being 17. Much interest was aroused in the question and the campaign was hard fought.

STREET CLEANING AND REFUSE DISPOSAL

May Use Glass Trash Cans.

Birmingham, Ala.—Glass trash cans illuminated at night may be an innovation on the downtown street corners of Birmingham in the near future. The trash can proposition now before the commission has been postponed until the commission meeting, a week hence. The negotiations up to date had been in regard to a galvanized iron can with advertising on the four sides, the cans to be given to the city free and the city to receive a percentage of the advertising. The wire-glass proposition was brought up recently and appeared to appeal rather strongly to the commissioners. It was stated that the glass cans would be illuminated from the inside at night, so that the advertising on them could be read then as well as in daylight. This advertising will be entirely under the control of the city if the proposition is accepted.

Favors Use of Auto Sprinkler.

Bridgeport, Conn.—If Director of Public Works J. A. Courtade is enabled to carry out his plans, the city of Bridgeport will do most of the street sprinkling with water this coming summer and thereby effect a considerable saving in case the figures arrived at by Mr. Courtade prove true. He proposes to do this work with an automobile sprinkler having a water tank with a capacity of 1,200 gallons, and will also use in connection with this work three Hvass scrubbers. Bids for supplying such an automobile sprinkler have already been received by the Board.

Accept Incinerator.

Berkeley, Cal.—The City Council has accepted the municipal garbage incinerator recently installed. According to specifications of the Refuse Disposal Company, which erected the plant, the minimum cost of operation will be 52 cents per ton for garbage consumption.

First Ornamental Waste Box in Dayton.

Dayton, O.—For the inspection of city officials and citizens of Dayton, the Kramer Brothers' Foundry Company of this city has placed on a street corner an ornamental



Courtesy Dayton (O.) News.
ORNAMENTAL WASTE BOX.

iron waste box. The box consists of a pedestal for a beautiful flower urn and is about five feet in height and has a base of 18 square inches. Near the middle of the stand is an opening, into which paper or other waste matter may be deposited, the inside being equipped with a gunny sack, which serves as a receptacle. When this is filled it may be removed and another substituted. For its removal there is a door that may be opened with a key, which, of course, would be in possession of any one in charge of the street cleaning operations so that the boxes may be relieved or emptied at stated intervals. This door is larger than the opening through which the material is deposited, in order that ample room is provided for the removal of the gunny sack, after it shall have been filled with waste. This innovation in waste receptacles has been favorably commented on

by many and it has been suggested that the City Commission purchase a number of them.

Electricity from Garbage to Light Streets.

New Orleans, La.—The city commissioners have perfected a plan by which the electricity for lighting the streets and public buildings will be developed by incinerating the waste garbage and refuse. New Orleans has a daily garbage and refuse burden of about five hundred tons, from the disposal of which a total of thirty million kilowatts of electricity can be generated a year. The city now uses only about seven million kilowatts a year, at a cost of \$281,000 for lighting the streets and public buildings. That contract expires in September, 1915, and the engineering experts connected with the utility commissioner's office estimate that a plant to dispose of the garbage will cost \$750,000.

RAPID TRANSIT

Denver to Build Large Railroad Tunnel.

Denver, Colo.—The Moffatt Tunnel Commission of the city of Denver has begun preparations for the construction of the Denver and Salt Lake Railroad through the Continental Divide. As a result of the recent election the City Council must pass the ordinance for the immediate issue of \$3,000,000 4½ per cent. bonds for the promotion of the scheme. The railroad company pledges itself to begin the construction of the line from Craig, Colo., to Salt Lake immediately. The tunnel will be six and four-one-hundredths miles long, one of the longest in America. It will extend under Long's Peak from the Denver end of the road to Craig, thus reducing the mileage of the Denver and Salt Lake line which now runs over the Divide, 26 miles, and the distance from Denver to Salt Lake, as compared with the next shortest line, the Union Pacific, 92 miles. All transcontinental traffic will thus be shortened by 92 miles. By the terms of charter amendment, under which bonds were voted, the city reserves the right to the tunnel for water and power purposes perpetually, although the road is to pay all interest on the bonds and has the right to take them up when it is able. The city also reserves the right to the minerals that may be found in the construction of the tunnel.

MISCELLANEOUS

Mayors Will Tour Europe.

Johnstown, N. Y.—W. C. Howland, President of the National Bureau of Municipal Research, has completed the plans for the 1914 tour of the bureau, which includes Mayors and other officials in the United States. He has mailed out the bulletins to the heads of the governments of all the cities and states in the Union. This annual trip is for the benefit of the managers of city and state affairs who are interested in improving their own local conditions by a study of affairs as they are conducted in foreign cities and governments. About 100 are expected to take this year's trip, which will cover Germany, Belgium, Switzerland and England. The reservations will close April 15, 1914, and by the arrangements that the National Bureau has made, the total cost of the tour will be \$505 including transportation, hotels, meals, carriages, etc., from New York and return.

Ask for More Recreation Funds.

Providence, R. I.—The board of recreation has asked for an appropriation of \$27,051 for its fiscal year, which is an increase over last year's appropriation of \$15,551. The additional money will be used to provide for a supervisor's salary of \$2,500 and to meet the extra expenses of maintaining playgrounds for three instead of two months each year, besides stimulating autumn and winter sports in the parks. The board feels that the sum asked is a conservative one if the policy of increasing the work and affording all the sections of the city recreation is to be continued.

Great Saving From Municipal Sale of Meat.

Nuremberg, Germany.—A saving of \$2,300,000 to the citizens of Nuremberg resulted from that German municipality's sale of meat at cost prices during 1913. Statistics recently made public show that the 15 retail shops maintained by the city sold only 4.3 per cent of the meat locally consumed last year. Thus about 15,400 of Nuremberg's 358,500 population, or, in round figures, 4,000 families, enjoyed the benefits of the city's sales of meat at cost prices. The City Statistical Office, taking the lowest prices prevailing at the regular meat markets, finds that on an average the city sold beef at least 4 cents, pork 3 cents, and veal 2½ cents per pound cheaper than the regular butchers, the average for all meats being about 3½ cents per pound cheaper. As the consumption of meat in Nuremberg was 130 pounds per capita, this means a direct saving through the city meat markets of something more than \$70,000. The facts are that the saving to the people of Nuremberg was many times greater than that sum, and that not only the small fraction of the people who patronized municipal

meat markets but the entire population derived material benefit from the city's action. The differences in price between the regular meat markets and the city markets were at least double the minimum figures which the statistical office has used, but the main benefit was the keeping down of prices in the regular shops to the limits of normal profits. The statistical office does not commit itself on this feature of the city's activities; but taking into account the sudden drop in the prices of meats of all kinds when the municipal markets were opened in the fall of 1912, it is naming a minimum figure to say that all meat sold in Nuremberg in 1913 was sold for 5 cents per pound less than if the municipal markets had not existed. Thus, instead of only 4,000 families saving about \$70,000 by reason of the competition of the municipal markets, the 90,000 families of Nuremberg actually saved about \$2,300,000 on their meat bills during the year, because the city has gone into the business of retailing meat on its own account.

Art Commission for City Favored.

Sacramento, Cal.—The appointment of an art commission to have full charge of the erection of the \$26,000 Coleman Memorial Fountain, will be recommended to the City Commission by the Central Council of the Chamber of Commerce Planning Committee. The Council suggests that the Art Commission consist of an architect, sculptor, painter and two business men.

Damaging Storm in Southern California.

Los Angeles, Cal.—Causing a loss of seven lives and leaving in its wake property damage amounting to \$4,500,000, the recent storm, which menaced Los Angeles and



STREET IN LOS ANGELES FLOODED BY STORM.

many cities nearby, severely crippled railway and trolley service and for the time cut off all means of communication. The accompanying illustration gives some idea of the extent of the flood in Los Angeles streets. It is said that the damage sustained by pavements was nearly \$250,000.

Proceeds from the Sale of Waste Paper for City Poor.

Pittsburgh, Pa.—The proceeds from the sale of waste paper in Pittsburgh net \$800,000 a year. This fact was made known at a meeting held here to devise means of providing for the city's poor. It was declared by business men that a fund sufficient to support many indigent families could be realized if a quarter of the paper could be conserved for sale for charitable purposes. The owners of the large office buildings of the city have pledged the return of all the waste paper from their property to the Pittsburgh Association for the Improvement of the Poor. The association will collect this material in wagons and sell it in carload lots. Mayor J. G. Armstrong has issued orders that all waste paper from the buildings and offices of the city should go to the association.

Municipal Reference Library for Public.

New York, N. Y.—Controller Prendergast has obtained the approval of the Board of Estimate to make the municipal reference library a branch of the Public Library, with quarters in the Municipal Building. Mr. Prendergast submitted a schedule of salaries and expenses as follows: A librarian at \$3,500, an assistant at \$2,400, cataloguer at \$1,200, stenographer at \$900, two clerks at \$300 each, and \$7,000 for furniture, books and stationary.

LEGAL NEWS

A Summary and Notes of Recent Decisions— Rulings of Interest to Municipalities

Injury to Minor—Ordinary Care.

City of Louisville v. Lee et al.—An instruction, in an action for injuries to a minor, that ordinary care, as applied to him, meant that degree of care which may usually be expected of boys of his age, capacity and experience, under similar circumstances, was proper.—Court of Appeals of Kentucky, 126 S. W. R., 1141.

Ordinances—Assessments—Variance.

City of Chicago v. Edens.—There is a substantial variance between an ordinance providing for a cinder sidewalk without providing for backfilling and the engineer's estimate stating the cost of the sidewalk and the cost of a curb filled with earth, so that the sidewalk is erroneous.—Supreme Court of Illinois, 103 N. E. R., 996.

Improvement Resolution—Modification After Hearing.

Village of Odell v. Chicago & A. R. Co.—Local Improvement Act requiring the Board to pass a new resolution if any modification is made in the original resolution at the final public hearing is mandatory.—Supreme Court of Illinois, 103 N. E. R., 994.

Conduit Under Sidewalks—Care.

Adlington v. City of Viroqua et al.—Under St. 1911, requiring every lot owner to keep the sidewalks in repair in front of his lot, an abutting owner has the primary duty of cleaning out a conduit under the sidewalk through which flows drainage water, so as to prevent the conduit from forming ice on the sidewalk, rendering it unsafe.—Supreme Court of Wisconsin, 144 N. W. R., 1130.

Injury—Debris in Street.

Pettit v. City of Belle Plaine.—On an issue whether debris in a street alleged to have resulted in injury to plaintiff had been at the place of the accident for any length of time prior to the injury, evidence that it had been scattered on the traveled part of the street, without reference to "when," could not be regarded as referring to a time prior to the injury.—Supreme Court of Iowa, 144 N. W. R., 1015.

Improvements—Presumption of Benefits.

Village of River Forest v. Cummings et al.—Where a proceeding to condemn land for a street made no provision for the removal of a building standing in and obstructing the land taken so that it could not be used as a street, the presumption that the building would be removed so as to enable the street to be used as such was not sufficient to support assessment for benefits on adjacent property, although the building was not large and might easily be demolished or removed.—Supreme Court of Illinois, 103 N. E. R., 971.

Shade Trees—Obstruction of Sidewalks.

City of Franklin v. Lacey.—Though equity will, where there is no right of appeal from a city court, enjoin prosecutions by the city which are unreasonable or oppressive, yet under an ordinance making the obstruction of sidewalks unlawful, prosecutions of a property owner for permitting the trunks and roots of his shade trees to project onto the sidewalk is not unreasonable or oppressive, in the absence of any showing that the city authorities were actuated by any improper motives.—Court of Appeals of Kentucky, 126 S. W. R., 1126.

Prosecution Before Recorder.

City of Sumter v. Hogan.—Where counsel for accused notified the recorder that he would require the testimony of the witnesses to be reduced to writing, but failed to call the Court's attention to his failure to have the witnesses sign their testimony immediately after giving same, though he knew during the trial that such failure was due to an oversight on the part of the recorder, the right to object to such failure, the witnesses having signed within 48 hours, was waived.—Supreme Court of South Carolina, 80 S. E. R., 497.

Injury—Street Cleaning Wagon—Nuisance.

Bruhke v. City of La Crosse.—A city was not liable for injuries to a child by negligence of the driver of a dump wagon for street cleaning in dumping the wagon while the child was in contact with the wagon chains, either on the theory that the wagon was attractive to children, or otherwise; the use of the wagon on the street being lawful and not constituting a nuisance.—Supreme Court of Wisconsin, 144 N. W. R., 1100.

Improving Harbor—Protecting Land.

Boettger v. City of Two Rivers.—The improvements which a city may make under St. 1911, authorizing any city at its option to improve and maintain any harbor so as to make it navigable and for the assessment of benefits on lands benefited, must be primarily made to improve the navigation of a harbor, and not to prevent the encroachment by water on the adjacent land, and a city may not construct a dock to act as a breakwater to protect the lots on which it was built and the street adjacent thereto from being washed away, and assess any part of the cost on property benefited.—Supreme Court of Wisconsin, 144 N. W. R., 1097.

Assessments—Rejection of Roll.

Allen et al. v. City of Bellingham et al.—Under Laws 1911, authorizing the Council or legislative body of a city to set aside an assessment roll for a local improvement, and order that such assessment be made de novo, where after a judgment vacating an assessment the City Council adopted an ordinance providing for the making of a reassessment, but, upon the submission of the new assessment roll prepared by the Board of Public Works, rejected such roll, a further reassessment could be made and confirmed without the adoption of a new ordinance directing such further assessment.—Supreme Court of Washington, 137 P. R., 1016.

Constructing and Relaying Sidewalks.

Ricketson et al. v. City of Milwaukee et al.—Milwaukee Charter, c. 7, § 16, as first enacted by Laws 1874, provided for the keeping of sidewalks in repair by the Board of Public Works, and that it might employ necessary labor for the repairing of sidewalks and cause sidewalks to be taken up and relaid with part new and part old materials. The section further provided for notice to the owners of the necessary repairs. This section was successively amended by Laws 1882 and Laws 1889, so that as it now stands it provides for the making of repairs without notice. Held, that as section 17 expressly provides for the laying of new sidewalks without notice to the property owner when the sidewalk shall have been declared dangerous by resolution of the board, section 16 must be taken to refer solely to the repair of old sidewalks and will not authorize the Board of Public Works in laying a new sidewalk without notice to an abutting owner.—Supreme Court of Wisconsin, 144 N. W. R., 1101.

Assessment Ordinance—Failure to Give Notice.

Gilson et al. v. Incorporated Town of Hoxie et al.—Kirby's Dig. provided for the publication of ordinances creating a local improvement district and levying assessments in a newspaper published in the city or town in which the district was organized. An ordinance establishing a local improvement district and attempting to levy an assessment having been published in a newspaper printed in an adjoining town was passed, providing that "hereafter" publications shall be made in a newspaper published in the city or town where the district is established, if there be such paper, and if not, then the publication shall be made in some newspaper published in the same county and having a circulation in the city or town, provided that any district previously formed where publication has been made according to the provisions of the act as amended shall be valid as if publication had been made under the strict letter of the section amended. Held, that while such curative act was valid and cured the defect in the ordinance creating the district, since the Legislature might have dispensed entirely with such publication, it was not effective to cure the failure to give notice of the assessment which was therefore void.—Supreme Court of Arkansas, 162 S. W. R., 568.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Highway Improvement.—Discussion of Federal aid laws, etc. 1½ pp., The Municipal World, February. 10 cts.

Progress Made for the Building of the "Boone Way." By J. Maret, Mt. Vernon, Ky. 1 p., Southern Good Roads, February. 10 cts.

Japanese Road Development. Locally financed system of national, provincial and village highways; growth and prospects. ½ p., Engineering Record, February 7. 10 cts.

Highways and Highway Surveying. Practical suggestion applicable to road finances and engineering, outline of survey work and examples of established methods. By D. J. Hauer, construction economist. Curves. 4½ pp., Canadian Engineer, February 19. 10 cts.

Annual Report of New York State Highway Department. Financial statement and defense of reorganized departments submitted by Commissioner Carlisle. New maintenance legislation. 1 p., Engineering Record, February 14. 10 cts.

Construction in Mountainous Sections. Road. By W. F. Cocke, Ill. 3½ pp., Southern Good Roads, February. 10 cts.

Road Construction in Massachusetts with Refined Tar. By P. P. Sharples, Ill. 3 pp., Southern Good Roads, February. 10 cts.

Portable Railways for Hauling Materials for Road Construction. Ill. ½ p., Engineering and Contracting, March 4. 10 cts.

Road Making and Maintenance. Hire or purchase of steam rollers. Report of Hertfordshire County Council. ½ p., Municipal Journal, London, February 6. 10 cts.

Labor Problem in Road Construction. By P. St. J. Wilson, assistant director U. S. Office Public Roads. 1½ pp., Southern Good Roads, February. 10 cts.

Growth of the Convict "Honor System." Ed., ½ p., Southern Good Roads, February. 10 cts.

Engineers of the New York State Highway Department. How the New Division Was Selected. ¾ p., Engineering News, February 12. 15 cts.

District Highway Engineers for Sparsely Settled States. Co-operative plan proposed by W. S. Gearhart, state engineer, before Kansas Engineering Society. ¾ p., Engineering Record, February 14. 10 cts.

Highway Engineering by District Highway Engineers as Managers. Map. ½ p., Engineering and Contracting, February 4. 10 cts.

Road Maintenance. Methods and Costs for Year 1913 in Wayne County, Mich. 1¼ pp., Concrete-Cement Age, February. 15 cts.

Some Principles Pertaining to the Administration and Financing of Highway Construction and Maintenance. 1 p., Engineering and Contracting, February 28. 10 cts.

Sub-Organization for Securing Efficient Maintenance. By J. N. Carlisle, state highway commissioner of New York. 1 p., Southern Good Roads, February. 10 cts.

Vehicles. Limiting Weights of. Need of road conservation. Ed., ¼ p., Municipal Journal, March 5. 10 cts.

Motors and Road Maintenance. Ed., ½ p., Municipal Journal, London, February 13. 10 cts.

Concrete in Road Construction. Abstracts of three papers presented at the National Conference of Concrete Road Building, held in Chicago Feb. 12-14. 3 pp., Engineering Record, February 28. 10 cts.

Investigation of the Causes of Expansion and Contraction of Concrete Road with Reference to the Prevention of Cracks. Ill., 4½ pp., Engineering and Contracting, February 25. 10 cts.

Concerning Concrete Roads. Ed., 2 pp., Engineering News, February 12. 15 cts.

A Review of the Whys and Hows of Concrete Road Construction. Paper before Engineers' Club of Philadelphia. By L. R. Ferguson, M. A. S. C. E. 4 pp., Concrete-Cement Age, February. 15 cts.

Reports of the National Conference on Concrete Road Building. Ill., 7 pp., Engineering News, February 26. 15 cts.

Contraction and Expansion of Concrete Roads. Importance of moisture expansion and design of sub-base, reinforcement and joints discussed in report of committee at National Conference on Concrete Road Building. 1 p., Engineering Record, February 28. 10 cts.

Construction of the Crackless Concrete Pavement. By S. T. Morse, consulting engineer. Ill., 1 p., Engineering and Contracting, March 4. 10 cts.

Volume and Cost of Water Required for Concrete Road Construction. ½ p., Engineering and Contracting, February 11. 10 cts.

The Technical Results of the Conference in Concrete Road Building. Ed., ½ p., Engineering and Contracting, February 25. 10 cts.

Handling Materials for Concrete Roads. Economic methods of dealing with water and aggregates presented in a committee report at the National Conference on Concrete-Road Building. 1 p., Engineering Record, March 7. 10 cts.

Avoidable Defects in Concrete Paving. By F. F. Rogers. 1 p., Contract Record, February 11. 10 cts.

Standards of Concrete Road Construction. Abstracts of committee reports at National Conference in Chicago. 2½ pp., Engineering Record, February 21. 10 cts.

General Methods of Concrete Road Construction in Ohio. Conclusions from service records. 2 pp., Engineering and Contracting, March 4. 10 cts.

Recommendations for Concrete Road Building. Principles advocated by National Conference on Concrete-Road Building. ¾ p., Engineering Record, February 28. 10 cts.

Bituminous Top Pavement. Spokane. 1 p., Municipal Journal, March 5. 10 cts.

Methods and Cost of Constructing at Clinton, Iowa; Concrete Pavement with Bituminous Surface. 1 p., Engineering and Contracting, February 25. 10 cts.

Method and Cost of Constructing Concrete Road with Bituminous Wearing Surface in California. By C. L. Rakestraw, resident engineer. Ill., 5½ pp., Engineering and Contracting, February 11. 10 cts.

Bituminous Macadam Road. Methods and Cost of Constructing a. Across Lava Flows on the Island of Hawaii. By M. J. Adams, Ch. Eng. 1 p., Engineering and Contracting, March 4. 10 cts.

Road Experiments. The advantages of bituminous macadam. By W. G. Bryning, surveyor. ½ p., Municipal Journal, London, February 13. 10 cts.

Brick Roads in King County, Washington. Cost of. Eighteen miles of highways practically completed at a cost of \$450,000. ½ p., Engineering Record, February 7. 10 cts.

Permanency in Modern Road Building. By E. C. Wells. National Paving Brick Mfrs. Assn. Ill., 1 p., Contract Record, February 11. 10 cts.

Progress in Manufacturing Vitrified Paving Brick: the Wire-Cut-Lug Brick. By W. C. Perkins, Inspection Dept., Dunn Wire-Cut-Lug Brick Co. Ill., 1½ pp., Engineering News, March 5. 15 cts.

Brick Cinder Road in Mississippi. Methods and Cost of Constructing a. Tables. ¾ p., Engineering and Contracting, February 4. 10 cts.

Petrolithic Pavement in Cudahy City, Cal. Methods and Cost of Constructing a. By C. G. Varcoe, inspecting superintendent, Los Angeles, Cal. 1 p., Engineering and Contracting, January 28. 10 cts.

Sand-Gumbo Road in Nebraska. Methods and Cost of Constructing a. Tables. ¾ p., Engineering and Contracting, February 4. 10 cts.

Bituminous Shell Road. Method and Cost of Constructing 7,200 feet of Water-bound and 9,100 feet of. ¾ p., Engineering and Contracting, March 4. 10 cts.

Paving Statistics of American Cities. Showing new paving done in 1913; sidewalks, curbs and gutters laid; resurfacing done and work contemplated. Tables. 25 pp., Municipal Journal, March 5. 10 cts.

Municipal Asphalt Plant of Manhattan Borough. The largest municipal plant in the country; capacity 3,500 sq. yds. of complete sheet asphalt pavement a day; details of appliances and construction. By D. B. Goodsell, assistant engineer, Highway Bureau, Manhattan. Ill., 2½ pp., Municipal Journal, March 5. 10 cts.

Economical Municipal Asphalt Repair Plant. Niagara Falls department repaired 17,364 sq. yds. of pavement during 1913 at \$0.71 per sq. yd., 53 per cent. of former contract price. ½ p., Engineering Record, February 28. 10 cts.

Portable vs. Stationary Asphalt Plants. Experience with one plant of each kind in Winnipeg, Man.; reasons why writer prefers portable plants. By J. W. Astley, C. E., city engineer of construction. Ill., 2 pp., Municipal Journal, March 5. 10 cts.

Wood Block Pavement. Methods of Constructing, in European Cities; and a Comparison of Wood Paving in European countries and the United States. 1½ pp., Engineering and Contracting, February 4. 10 cts.

Granite Block Pavements. Suggestions for the Utilization of. By R. H. Gillespie, chief engineer of sewers and highways, New York. 1½ pp., Contract Record, February 11. 10 cts.

SEWERAGE AND SANITATION.

Construction Plant and Methods Employed on Large Sewers in Detroit, Mich. Notes on. ½ p., Engineering and Contracting, February 25. 10 cts.

Methods and Cost of Constructing Large Brick and Concrete Sewers in Chicago, with Notes on the Cost Keeping System Employed. Ill., 4½ pp., Engineering and Contracting, February 11. 10 cts.

Interbay District of North Trunk Sewer of Seattle. Construction and costs for submerged 48-inch cast-iron outfall and concrete section, 9 to 12 feet in diameter, built largely in tunnel; length, 19,541 feet. Ill., 2 pp., Engineering Record, February 14. 10 cts.

Records of Sewer Work, Progress. Ill., ¾ p., Municipal Journal, February 19. 10 cts.

Sewer-Pipe and Roofing-Tile Tests of Western Canada clays. 2 pp., Canadian Engineer, February 19. 10 cts.

Methods Employed in Making Reinforced Concrete Sewer Pipe in the Open During Freezing Weather at Louisville, Ky. By G. D. Crain. ½ p., Engineering and Contracting, February 25. 10 cts.

The Manufacture of Sewer Pipe. Second of a series of articles. 1½ pp., The Clay-Worker, February. 25 cts.

Concrete Pipe Conduits. By F. A. Down. Ill., 1½ pp., Power, February 10. 5 cts.

Concrete Sewer Pipe at Kansas City, Mo. ¾ p., Engineering News, February 12. 15 cts.

Design and Operation of Small Sewage Pumping Stations. Essentials of design and comparison of adaptations of electrical, gas, gasoline, kerosene and steam power. ¾ p., Engineering Record, February 14. 10 cts.

Sewage Treatment at Sturgis, Mich. Separate sewerage system installed in manufacturing town of 5,000 population. Small pumping station in western section of city, automatically started and stopped. Treatment plant with maximum daily capacity of 78,200 gal.; automatic siphon feed. Ill., 1 p., Engineering Record, February 7. 10 cts.

A Comprehensive Sewage Disposal Project for New York. Ill., 1½ pp., Engineering News, February 12. 15 cts.

A Brief Review of Recent Advantages in Sewerage and Sewage Disposal. 1½ pp., Engineering and Contracting, February 25. 10 cts.

Sewage Treatment by Aeration and Contact in Tanks Containing Layers of Slate. By H. W. Clark and George Adams. Experiments at Lawrence, Mass., of two years' duration; description supplements article in Engineering Record of June 28, 1913. Summary of recent observations, preceded by a discussion of previous investigations, suggests that aeration may be used with economy of space and expenditure. 1½ pp., Engineering Record, February 7. 10 cts.

Fertilizer from Sludge. Nitrogen in sludge utilized by fermentation process with brewery waste at Dublin sewage works; hygienically and financially successful. ½ p., Engineering Record, February 7. 10 cts.

Sludge Measuring Device. Ill., ½ p., Municipal Journal, February 19. 10 cts.

Results of Sewage Treatment at Columbus, Ohio. 10-acre disposal works treated an average of 15,560,000 gallons daily during 222 days of service in 1913. Performance of tanks and sprinkling filters under trying conditions. ½ p., Engineering Record, February 21. 10 cts.

Lessons from the Sewage-Treatment Plant of Columbus, O. By Rudolph Herling, consulting engineer. 1½ pp., Engineering News, March 5. 15 cts.

Operation of Sewage Disposal Plants. Skimming, sedimentation and septic tanks—keeping daily records of operation—duplicate units—treatment of sludge and scum. Part II—Tanks. By F. E. Daniels, A. M. Ill., 2½ pp., Municipal Journal, February 19. 10 cts.

Distribution of Sewage on Filters. By Charles Hoopes. Tests of several types of sprinkling nozzles to determine uniformity of distribution by means of sectional plans and other characteristics. Ill., 2 pp., Engineering Record, March 7. 10 cts.

Some Suggestive Designs for Sewage Treatment Plants for Small Institutions. Ill., 1½ pp., Engineering and Contracting, February 4. 10 cts.

Sewage Disposal Testing Stations. Ed., ¼ p., Municipal Journal, February 19. 10 cts.

Experimental Sewage Disposal Plant at Brooklyn, N. Y. Includes Imhoff tanks, aerating tanks, siphon and filters; also sprinkling filters, settling tanks, sludge beds, sludge digesting tank and Rensch-Wurl screen. Construction details. Ill., 3½ pp., Municipal Journal, February 19. 10 cts.

Statistics on the Operation of Atlanta, Ga., Sewage Treatment Plant. ½ p., Municipal Journal, February 19. 10 cts.

House Connections, Sewerage. How Baltimore requires property owners to construct them and finances the cost for a five-year period. By W. T. Childs, deputy city comptroller. 1 p., Municipal Journal, February 19. 10 cts.

Explosions in Sewers. Studies of H. J. Kellogg, performed for Public Works Department of New Haven, Conn. 1 p., Engineering Record, February 28. 10 cts.

"Sewer Gas" Explosions. Calling attention to incorrect use of that term. Ed., ¼ p., Municipal Journal, February 19. 10 cts.

Sanitary Conservancy in Kingston, Jamaica. By A. Macdonald, M. D. D. P. H., 9 pp., Journal of State Medicine. 50 cts.

Experts to Redefine Sanitary Policy of Chicago. Unbiased investigation sought by Real Estate Board; \$10,000 raised by private subscription to finance new study. ½ p., Engineering Record, February 28. 10 cts.

Stream Pollution, The Control of. By Paul Hansen, engineer State Board of Survey, Urbana, Ill. Paper before Illinois Academy of Science. 4 pp., The American City, January. 25 cts.

Results of Studies Made to Determine Effect Upon Fish Life of Sewage and Sewage Treatment Plant Effluents. 1½ pp., Engineering and Contracting, February 4. 10 cts.

Sanitary Survey of White River. Abstract of paper read by Jay A. Craven, engineer, Indiana State Board of Health, at meeting of Indiana Engineering Society. 1/6 p., Engineering Record, February 7. 10 cts.

The Sanitary Control of Public Waterways. Functions, uses, control, diseases, problems, industries, purification of streams. Paper before League of Washington Municipalities. By E. R. Kelly, M. D. Ill., 4 pp., Pacific Builder and Engineer, February 28. 15 cts.

Typhoid Fever Epidemic, Centralia, Wash. Existing water system, organization to meet conditions and results obtained. By S. Macomber, city engineer. Ill., 1½ pp., Pacific Builder and Engineer, February 28. 15 cts.

Typhoid Epidemics. Ed., ¾ p., Pacific Builder and Engineer, February 28. 15 cts.

WATER SUPPLY.

Water Supply of Atherstone. Paper by H. J. Coleby, Engineer and Surveyor of District Council. 2½ pp., Water and Water Engineering, February 16. 15 cts.

The New Water Works for Port Alberni and Salmon Arm in British Columbia. Ill., 1½ pp., Contract Record, February 18. 10 cts.

Well Water Supply of Enid, Okla. Pump pit 30 feet deep drives water to two 1,000,000 gallon reservoirs supplying 14,000 people. ½ p., Engineering Record, February 14. 10 cts.

Cromer Water Supply. No filtering plant. Ill., 1 p., The Surveyor, February 20. 15 cts.

Laying Out New Water Supply System for Victoria, B. C. Gravity flow concrete pipe, 27.3 miles long, to convey from Sooke Lake 16 million gallons per day; a balancing reservoir and a 10-mile steel main. Ill., 2½ pp., Engineering Record, February 21. 10 cts.

History of the Montreal Water Works with an Outline of Present Improvements. Ill., 2 pp., Contract Record, February 11. 10 cts.

The Water Supply of Berlin. Figures for the year 1912. 1½ pp., The Surveyor, February 6. 15 cts.

The Proposed Extension of Toronto's Water Works System. Diagrams. 1½ pp., Contract Record, February 4. 10 cts.

Water Shed Forestry. By water bureau of Syracuse, N. Y., and College of Forestry of Syracuse University. Kinds of trees and methods. 1½ pp., Municipal Journal, February 26. 10 cts.

Rainfall, Evaporation and Runoff in Manitoba. Curves. 1½ pp., Canadian Engineer, February 19. 10 cts.

Intake Tunnel and Tower for St. Louis, Mo. New Water-Works. Ill., 3½ pp., Engineering News, February 12. 15 cts.

An Ice-Emergency Water Intake at Waukegan. Ill., 1 p., Engineering News, February 26. 15 cts.

Dam, The Lahonton. By A. V. Leonard, U. S. Reclamation Service. Ill., 3½ pp., Cement and Engineering News, February. 10 cts.

The Proposed Rock Run Storage Dam for the Additional Water Supply of Coatesville, Pa. Ill., 2 pp., Engineering and Contracting, February 11. 10 cts.

Standpipe. Field Notes on the Construction of a Great Concrete. By A. D. Whipple, constructing engineer, Milwaukee. Ill., 6 pp., Concrete Cement Age, February. 15 cts.

Pump Machinery, Centrifugal. Abstract of paper by J. W. W. Drysdale, Jr., B. Sc. Ill., 4½ pp., Canadian Engineer, February 12. 15 cts.

Tendencies in Electric Pumping Station Design. Ed., ¾ p., Engineering Record, February 28. 10 cts.

The Lardner's Point Pumping Plant in Philadelphia. Capacity 224 million gallons per 24 hours. By W. O. Rogers. Ill., 6½ pp., Power, February 17. 5 cts.

The Design and Operation of Small Pumping Stations. 1 p., Engineering and Contracting, February 4. 10 cts.

Aqueduct Tunnel, Reinforcing Ruptured Concrete Lining in High-Pressure. Roundout siphon of Catskill aqueduct, New York water supply, repaired by use of 730 tons of electrically welded steel rings. Types of reinforcement considered before choice was made; discussion of the work. 1 p., Engineering Record, February 28. 10 cts.

Repairing Montreal Water Supply Conduit. A 60-ft. length of 5½x7½-ft. reinforced-concrete low pressure conduit removed, broken up, replaced and rammed in eroded hole by an excavating machine. Seven-foot steel pipe 125 ft. long telescoped into both ends of injured conduit, packed with concrete and enclosed in a protecting shed, permitting resumption of service within 8 days. 1 p., Engineering Record, March 7. 10 cts.

Break and Repair of Montreal Conduit. Abstract of report by consulting engineers on recent failure of large reinforced low pressure conduit; break in 60-ft. section due to proximity of aqueduct canal excavation, as well as to weakness of conduit itself. Recommendations that dangerous sections be closely inspected, that construction of a new supply be started at once and that aqueduct be investigated. Ill., 3 pp., Engineering Record, March 7. 10 cts.

Grouting Water-Bearing Fissures in

Rock. 500-lb. pressure encountered in Catskill work. ¼ p., Engineering record, February 28. 10 cts.

Mains, Comparison of Joints for Cast Iron. Discussion by H. P. Coho, New York City, upon the properties and use of lead wool and mechanical calking. Curves and illustrations. 5 pp., The Gas Age, March 2. 10 cts.

Transporting Pipe Line Material Across a Desert by Motor Trucks. Ill., ¾ p., Engineering and Contracting, February 4. 10 cts.

Concrete and Tile Water Pipes. 1½ pp., Ill., Fire & Water Engineering, February 25. 10 cts.

Method and Cost of Laying Two 500-foot Experimental Sections of 30-inch Steel and Ingot Iron Lockbar Pipe at Utica, N. Y. By A. W. Peters, engineer in charge of construction. ½ p., Engineering and Contracting, February 25. 10 cts.

Meter Tests at San Diego. Endurance and accuracy of fourteen ½-inch meters determined. ½ p., Engineering Record, February 21. 10 cts.

General Specifications Under Which 3, 4 and 6-in. Meters of Velocity and Disk Type are Purchased by St. Louis Water Department. 1 p., Engineering and Contracting, February 25. 10 cts.

Machinery. Measures of Economy Available to Small Water Works in Selection and Operation of Devices and. 1 p., Engineering and Contracting, March 4. 10 cts.

Purification of Water, Lawrence Experiment Station Studies in the. 2½ pp., Engineering and Contracting, January 28. 10 cts.

The Treatment of Plumbo-Solvent Water by Means of Mechanical Filters. By Frederick John Dixon, M. Inst. C. E. Ill., 12 pp., Water & Water Engineering, February 16. 15 cts.

Notes on the Proper Use of Chlorinated Lime for the Disinfection of Drinking Water. ¾ p., Engineering and Contracting, February 4. 10 cts.

Belmont Filter Roof Failure. Concrete groined arch roof collapses ten years after construction, due to settlement of fill under filter. By G. L. Steele. Ill., 1½ pp., Municipal Journal, February 19. 10 cts.

Some Features of the Design and Construction of the 12 Million Gallon Mechanical Water Filtration Plant at Evanston, Ill. Ill., 3 pp., Engineering and Contracting, February 4. 10 cts.

Data on Water Purification in Illinois: Process and Plant Details. Ill., 3½ pp., Engineering and Contracting, February 11. 10 cts.

Filter Operating Costs at Toronto. Average for 1912 at slow-sand plant shows expense of \$1.03 per million. ½ p., Engineering Record, February 7. 10 cts.

Mechanical Filtration Plant for Toronto. Supplementary works to be located next to present slow sand plant at a cost well over \$1,000,000; capacity to be 72,000,000 U. S. gal. daily. ½ p., Engineering Record, February 28. 10 cts.

Removal of Iron and Manganese from Water. Statement of general problem, experiments at Cohasset, Middleboro and Brookline, Mass., outlined, and plants for Conasset and Middleboro described. 2 pp., Engineering News, February 26. 15 cts.

Design, Construction and Operation of the New Water Purification and Pumping Plants at Bridgeton, N. J. Ill., 2½ pp., Engineering and Contracting, March 4. 10 cts.

Bridgeton Filtration Works. Coagulation basin, gravity rapid filters and chlorine tank; details of each; pumping plant; efficiency of filters and pumps. Ill., 1½ pp., Municipal Journal, February 26. 10 cts.

Lead Poisoning in Water Supply. Abstract of report by Dr. Frank Seymour. 4½ pp., Water & Water Engineering, February 16. 15 cts.

The Occurrence and Isolation of B. Coli in Water. 1 p., Engineering and Contracting, February 4. 10 cts.

Operation of Water Works Properties, Influence of State Regulation Upon Economy and Efficiency in the. By W. Kiersted, consulting hydraulic and sanitary engineer. 2½ pp., Engineering and Contracting, February 25. 10 cts.

Cleaning a Water-Works Intake Well at Florence, Kan. By H. M. Plaisted, mechanical engineer. Ill., ¾ p., Engineering News, February 12. 15 cts.

Method of Making a General Investigation and Efficiency Test of the Lorain, Ohio, Water Works Results and Recommended Improvements. Curve. 4½ pp., Engineering and Contracting, January 28. 10 cts.

Charges, Water Department. ¼ p., Municipal Journal, February 26. 10 cts.

Court Decisions of Controversies Be-

tween Water Companies and Individuals Claiming Damage by Polluted Water, Digest of. 1½ pp., Engineering and Contracting, March 4. 10 cts.

Enforcing Water Contracts. Is city or consumer proper plaintiff in suit against water company for violation of contracts? Court decisions. By J. Simpson. 1 p., Municipal Journal, February 26. 10 cts.

Consulting Engineer in Water Works Practice. By J. W. Alvord, consulting engineer, Chicago. 2 pp., Engineering and Contracting, February 18. 10 cts.

STREET LIGHTING AND POWER PLANTS.

Street Lights in Washington, New. Luminous arc lamps for business street illumination with special modifications. Novel segment glass globes, posts of special design and street name signs. Ill., 2 pp., Municipal Journal, February 26. 10 cts.

Street Lighting as a Police Auxiliary. Relation between the decrease of crime and the increase of illumination. Ed., ½ p., Municipal Journal, February 26. 10 cts.

Distribution of Electrical Energy. Report of sub-committee on distribution. Ill., 30 pp., Proceedings American Institute of Electrical Engineers, February. \$1.

Illumination Wiring. A formula for distribution—line extensions. 1½ pp., Electrical World, February 7. 10 cts.

Alternating-Current Supply in New York City. History of alternating current supply in New York. Ill., 5 pp., Electrical World, February 7. 10 cts.

Substations in Pennsylvania, Indoor and Outdoor. By H. L. Fullerton. Ill., 16 pp., Proceedings, American Institute of Electrical Engineers, February. \$1.

Gas Distribution, Modern. Oxy-acetylene welding a factor. By D. E. Keppelmann, superintendent Pacific Gas & Electric Co. Ill., 1½ pp., Acetylene Journal, February. 5 cts.

Development of the Natural Gas Industry in California and the Building of California's First Large Natural Gas Line. By W. E. Barry. Ill., 5 pp., American Gas Light Journal, February 9. 10 cts.

Water Powers on the Winnipeg River. From report submitted by the Public Utilities Commission. Ill., 8 pp., Canadian Engineer, February 12. 15 cts.

Policy of Washington Administration on Water Power Development. ¾ p., Electrical World, February 23. 10 cts.

Auglaize Power Development. By R. Trautchild. First plant of a series of four low-head water powers ultimately to generate 28,000 to 30,000 kw for cities in Ohio and Indiana. Ill., 3 pp., Engineering Record, March 7. 10 cts.

Power Development at Saxon Falls. By C. A. Alderman. Multiple arch concrete dam feeding wood stave pipe line and surge tank in Michigan project. Power house and transmission lines described. Ill., 3 pp., Engineering Record, February 28. 10 cts.

Boilers, The Deterioration of Engines and. By E. Ingham. 1 p., Power, February 17. 5 cts.

Recording Meter Measuring Boiler Blowoff Discharge. Ill., 1½ pp., Power, February 24. 5 cts.

Automatically-Timed Firing. Ill., 1½ pp., Power, February 10. 5 cts.

The Economical Burning of Fuel. Abstract of paper. By J. P. Greenwood. 2 pp., Power, February 24. 5 cts.

Cause and Remedy for Clinkers. By F. Webster. Tables. 2½ pp., Power, February 17. 5 cts.

Chimney Capacity for Burning Waste Fuel. By D. M. Myers. 1½ pp., Power, March 3. 5 cts.

Oil, Operating Troubles When Burning. By J. J. McIntosh. Ill., 1½ pp., Power, February 10. 5 cts.

Steam Turbine Plant, Model Mixed-Flow. By W. O. Rogers. Ill., 4 pp., Power, February 10. 5 cts.

Gas Engines, How to Calculate the Losses in. Simple calculations showing how to figure the heat balance of a gas engine with a degree of accuracy close enough for ordinary purposes. By G. W. Muench. 1½ pp., Power, February 17. 5 cts.

Safety Devices, Power-Plant. Ill., 1½ pp., Power, March 3. 5 cts.

Accounts, Power Plant. First of a series of articles showing the items to be included, how the information is to be obtained and charges distributed, and in general the method of meaning of power-plant accounts. 1 p., Power, February 24. 5 cts.

Rate, Some Notes on the Large Power. By E. D. Dreyfus. Curves. 5 pp., Electrical Review and Western Electrician, February 28. 10 cts.

FIRE AND POLICE.

Fire Prevention and Insurance. Uniform classification of risks. By E. G. Richards. 2½ pp., The Real Estate Magazine, February. 25 cts.

Two-Platoon System, The. How it works at Kansas City and Omaha. 1½ pp., Municipal Journal, February 12. 10 cts.

Civil Service Examination for Chiefs at Philadelphia. 5-6 p., Fire and Water Engineering, February 25. 10 cts.

Fire Apparatus Statistics. Showing horse-drawn, motor-propelled and hand-drawn apparatus. 3 pp., Municipal Journal, February 12. 10 cts.

Motor Fire Apparatus. Comment on and excerpts from fire reports bearing on motor apparatus. Ed., ½ p., Municipal Journal, February 12. 10 cts.

Road Apparatus in Deep Snow. ½ p., Fireman's Herald, February 28. 5 cts.

Police Signal System, South Bethlehem. Ill., 1½ pp., Municipal Journal, February 26. 10 cts.

GOVERNMENT AND FINANCE.

City Manager Government. Its origin at Staunton, Va., the Staunton ordinance; arguments in its favor. By C. E. Ashburner, city manager, Springfield, O. 1¼ pp., Municipal Journal, February 26. 10 cts.

City Manager Plan. Ed., 1-6 p., Engineering Record, March 7. 10 cts.

The City Manager Plan no Novelty. By H. S. Gilbertson. 1½ pp., The American City, January. 25 cts.

Business Management for Cities. Abstract of address by Henry M. Waite, city manager of Dayton, Ohio, before the Indiana State Sanitary and Water Supply Association at Indianapolis, Feb. 26. 1 p., Engineering Record, March 7. 10 cts.

Commission Form vs. City Manager Plan. A word of caution. By E. S. Bradford, Washington, D. C. 2 pp., The American City, January. 25 cts.

Commission Government a Failure. Experience of St. John, N. B. By C. MacKay. 1 p., Canadian Municipal Journal, February. 10 cts.

Home Rule, Municipal. By A. Roberts, town solicitor of Bridgewater, N. S. Extract from paper before convention of the Union. 1 p., Canadian Municipal Journal, February. 10 cts.

Municipal Ownership in Edmonton, Alta. By W. Short, K. C., ex-mayor. 1 p., Canadian Municipal Journal, February. 10 cts.

Public Utilities and Public Service Commission. By J. F. Ford, mayor, Fort Dodge. Before League of Iowa Municipalities. 6 pp., American Municipalities, February. 20 cts.

Suggestions for Public Utility Rate Making. By W. B. Raymond. Extract from paper before Municipal Lighting convention before University of Iowa. 2 pp., Engineering News, March 5. 15 cts.

The Engineer's Part in the Regulation of Public Utilities. ¾ p., Engineering and Contracting, January 28. 10 cts.

What Inducements Does Public Service Commissionship Offer to Engineers? Ed., ¾ p., Engineering and Contracting, February 4. 10 cts.

Public Service Regulation. By W. F. Stipe, Chairman, Iowa House Committee on Public Utilities, before League of Iowa Municipalities, February. 20 cts.

City Jobs, Picking Fittest Men for. By W. H. Allen. 2 pp., The American City, January. 25 cts.

Bonds, The Market for Municipal. 1 p., The Bond Buyer, February 28. 25 cts.

STRUCTURES AND MATERIALS.

Bridge Construction, Needed Reforms in Highway. By H. A. Rice, Prof. Mechanics, Univ. of Kansas. ¾ p., Engineering News, February 12. 15 cts.

Design Features of the Reinforced Concrete Viaduct in Cincinnati, O. Ill., 2½ pp., Engineering and Contracting, February 25. 10 cts.

Concrete Bridges; Relative Advantages of Different Types. Ed., ¾ p., Engineering and Contracting, February 25. 10 cts.

Concrete Bridges in St. Louis Parks and Some Cost Figures. Ill., ¾ p., Concrete-Cement Age, February. 15 cts.

New Suspension Bridge Spanning the Kaatenay River. Ill., 1½ pp., Contract Record, February 11. 10 cts.

Design and Construction of the Bush and Gunpowder River Bridges, Consisting of a Series of Reinforced Concrete Slab Stones. Ill., 4½ pp., Engineering and Contracting, February 11. 10 cts.

The Proposed Second Narrow Bridge at

Vancouver, Ill., 2 pp., Contract Record, February 11. 10 cts.

Building a Concrete Bridge in Halves. Railroad traffic maintained while four-track reinforced concrete structure was built. Ill., 2 pp., Engineering Record, February 21. 10 cts.

Design and Cost of Ornamental Arch Bridges at Los Angeles. By R. W. Stewart, Bridge Engineer. Ill., 1½ pp., Engineering Record, February 14. 10 cts.

Retaining Walls, The Design of Plain and. By F. N. Taylor, M. Inst., Mun. E. Ill., 5 pp., The Surveyor, February 6. 15 cts.

Piles of Timber and Ferro-Concrete Compound. By Prof. R. Schonhofer, Dr. Ing. Ill., 2 pp., The Surveyor, February 13. 15 cts.

Fence Posts, Concrete-Steel. Four types of end, corner and straining posts used along the line on New York's Catskill aqueduct: Design and construction strength. By W. M. Stieve. Ill., 1 1-6 pp., Engineering Record, February 14. 10 cts.

Poles, Testing Reinforced-Concrete. Study of stresses causing failure of 12 long masts which were broken by pull on cable fastened 6 or 12 inches below tops. Ill., Engineering Record, February 14. 10 cts.

Cement, Chemistry of Salt Water. Notes on sandstone and gravel. By H. S. Taft. 4½ pp., Monthly Journal of Engineers' Club of Baltimore, February. 10 cts.

The Sieving of Cement. 2½ pp., Canadian Engineer, February 12. 15 cts.

Concrete, A New System of Reinforced. "Vibrocel"—its theory and its special application to subaqueous work. Economy and efficiency of this construction. By J. E. Holdcroft, A. M., Can. Soc. C. E., Vancouver, Ill., 4½ pp., Contract Record, February 18. 10 cts.

Stone, Elements on. Effect of heat and corrosion by gases as determined from experiments with building stone. By W. A. Barks, B. A. Ph. D. 1½ pp., Building and Industrial News, January 28. 10 cts.

Asphalts, Fixed Carbon Test as Applied to. By F. P. Smith, consulting engineer. 4½ pp., Canadian Engineer, February 5. 10 cts.

Iron in Soils, The Electrolytic Corrosion of. 1 p., Engineering and Contracting, February 4. 10 cts.

Electrolytic Theory of Corrosion. Ed., 1-6 p., Engineering Record, February 28. 10 cts.

Creosote Oil, Separating Water from. By T. White, Asst. Mgr. American Creosote Works. 1¼ pp., Canadian Engineer, February 5. 10 cts.

MISCELLANEOUS.

Street Cleaning Costs. Showing the relation between frequency of cleaning, amount of dirt removed, and the kind of pavement as determining cost of cleaning. Ed., ¾ p., Municipal Journal, February 12. 10 cts.

Refuse Disposal in Small Cities and Towns. By S. A. Greeley, consulting engineer. 2½ pp., The American City, January. 25 cts.

Refuse Disposal for Trenton. Incineration and reduction compared; power for pumping sewage; ashes to be dumped and burned in either case. 2½ pp., Municipal Journal, February 12. 10 cts.

Schenectady's Reduction Plant. Conveyors used for transferring garbage between receiving station, digestors, mixers, dryer, percolator, screen and storage room. Details of plant and operation. Ill., 2½ pp., Municipal Journal, February 12. 10 cts.

Automobile Operation, Experiences in. Paper by G. P. Smith, Jr., before New England Association of Gas Engineers. Ill., 3 pp., The Gas Age, March 2. 10 cts.

Trucking Costs. Comparative figures for haulage by horses and by motor trucks and tractors with and without trailers, taking into account both fixed and operating charges. ½ p., Engineering Record, February 7. 10 cts.

Standard Tires for Motor Trucks. By F. H. Sawyer, mgr., fire truck tire dept., The Goodyear Tire & Rubber Co. ½ p., Municipal Journal, February 19. 10 cts.

Couple Gear Tractor Systems. By V. W. Page, M. E. Ill., 2½ pp., Fire and Water Engineering, February 25. 10 cts.

Marshalltown's Auto Parking. Streets around court house widened and 16-foot strip reserved for automobiles, guarded by isles of safety. By H. J. Rodgers. Diagram and illustrations. 1½ pp., Municipal Journal, February 5. 10 cts.

Electric Vehicle Progress During 1913. By W. P. Kennedy. 2½ pp., Electrical World, January 3. 10 cts.

(Continued on page 381.)

NEWS OF THE SOCIETIES

Calendar of Meetings.

MARCH 16-17.

ARKANSAS ENGINEERING SOCIETY.—Third Annual Meeting, Pine Bluff. P. B. Hill, secretary, Little Rock.

April 4-11.

EFFICIENCY SOCIETY, INC.—First National Efficiency Exposition and Congress, Grand Central Palace, New York City. W. H. Tallis, exposition director, 41 Park Row, New York City.

APRIL 7-8.

MAINE ROADS CONVENTION—First Congress, under auspices of the State Grange and the Maine Automobile Association, Bangor. For information apply to Bangor Chamber of Commerce.

April 16-17.

TRI-STATE WATER AND LIGHT ASSOCIATION.—Annual Convention, Atlanta, Ga. F. C. Wyse, assistant secretary, Columbia, S. C.

April 23-24.

VIRGINIA PUBLIC HEALTH ASSOCIATION.—Annual meeting, University of Virginia, Charlottesville. Dr. M. G. Perrow, Lynchburg, Va., president.

May 11-15.

AMERICAN WATER WORKS ASSOCIATION.—Thirty-fourth Annual Meeting, Philadelphia, Pa. J. M. Diven, secretary, 47 State street, Troy, N. Y.

October 20-23.

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, New Orleans, La. James J. McFall, Secretary, Roanoke, Va.

Maine Fire Chiefs' Association.

The program for the annual convention, held in Biddeford, March 11, was as follows:

Meet at Assembly Room, City Building, at 10 A. M.

Address of welcome, Mayor J. G. C. Smith; address of acceptance, Chief Patrick H. Flaherty, Portland; adjournment.

1 P. M.—Shore dinner, Mitchell's.

3 P. M.—Business meeting at Hotel Thacher.

6.30 P. M.—Supper, Hotel Thacher.

Evening—Biddeford Business Men's Association Headquarters.

Address, D. D. Lovelace, secretary Business Men's Association; address, Chief John A. Mullen, Boston, address, "Fire Prevention," J. W. Blunt, insurance commissioner, Augusta; address, "Auto Apparatus," Clarence Sylvester, Lawrence, Mass.; address, Chief W. S. Mason, Bangor; address, "Fire Hose," John M. Hardy, Boston, Mass.

Chief Flaherty, of Portland, is president of the organization; Chief Mason, of Bangor, vice-president; Chief Buckley, of Augusta, secretary, and ex-Deputy Payne, of Portland, treasurer.

American Water Works Association.

The thirty-fourth annual convention will be held in Philadelphia, May 11-15, with headquarters at the Bellevue-Stratford. All day Tuesday, the 12th, will be devoted to the question box and exchange of experiences. This will be known as superintendents' day. The following questions have been submitted for consideration:

Do water meters increase or decrease cost of water supply to consumers?

How is the cost of installation and maintenance of meters borne?

Experience with lead or tin lined

iron pipe; comparative efficiency, life and cost?

What is the best method of making temporary repairs to pavements torn up for water works construction or repairs, putting in services, etc.?

Should private fire service be shut off, in case of fire in sprinkler-protected buildings, as soon as the fire department reaches the fire and is in action?

Experience with annoying noises caused by working of water meters?

What is the correct or best way of testing water meters? Is it practical to test meters, especially large sizes, in place?

Experience with straight line reading meters—are they preferable to the clock dial meters?

Legal decisions concerning "Averaging rate" when meter is out of order and not registering?

Possibility of and conditions governing over registration of meters?

Should meters record cubic feet or gallons?

How should house hot water boilers be cared for when water is shut off, what instructions should be given to occupants of houses?

Among the subjects suggested for discussion at the Experience Meeting are the following:

Standard Specifications for Meter and Valve Boxes.

Uniform Rules and Regulations, including rules and regulations for use of water, for setting and caring for meters, for putting in services, etc.

Use of Blow-Off Tees for hydrant branches on large mains, to bring the hydrant branches below danger of freezing, consideration to be given to danger of greater accumulation of sediment in such branches.

The true object of water analyses: what should the analyst report. Formulating of a uniform standard form for report of analyses.

A member has asked for information and a general discussion of air lift pumps for deep wells. Some short papers giving experiences with such systems is desired. If you do not prepare a paper, come to the convention prepared to relate your experience.

A discussion of the use of "First Aid Outfits" on water works. What outfit should be provided for the various branches of the service, and the necessary training of employees in their use?

A discussion on packing stuffing boxes of valves in place: material used and its durability. Can valves in ordinary valve boxes be packed without digging up streets: if not, the advisability of using valve boxes that will permit it?

Licensing of plumbers and enforcing rules and regulations governing them: methods used to secure prompt and full reports from plumbers.

House to house inspections, how and how often made. Should they be con-

stant by a small regular force, or should general periodical inspections be made? The cost and results of inspections.

Legal or Board of Health decisions or regulations concerning shutting off water for non payment of rates or violation of rules and regulations. Special information wanted concerning restraining injunctions.

Pickeral weed, its utility for absorbing algae.

Practice concerning charges for private fire service.

How typhoid statistics are gathered, and what is done towards tracing the source of the disease.

Electrolysis; distinguishing between its action and earth action on cast iron pipes, especially pipes in salt marsh.

J. M. Diven, 47 State street, Troy, N. Y., is secretary.

Illinois Water Supply Association.

The sixth annual meeting will be held, March 9-11, at the University of Illinois, Champaign-Urbana. The following program has been arranged:

Monday, March 9.

2 p. m., President's Address, C. H. Cobb, Supt. and Mgr. Water Works Co., Kankakee; Report of the Secretary-Treasurer, E. Bartow; Reports of Committees: Removal of Anchor Ice by Means of Air, L. A. Fritze, Chemist, Moline Water Dept., Moline; The Efficiency of a Triple Expansion Pumping Engine, Walter Reid, Supt. Water Works, Springfield; A Standpipe Failure, Experience Following the Flood of 1913, C. M. Roos, Manager Water Co., Cairo; Hypochlorite Treatment Now Firmly Established (Illustrated), C. A. Jennings, Supt. Filtration, Union Stock Yards, Chicago; Experiences with Waukegan Water Supply, W. J. Allen, Chief Engineer Water Works, Waukegan; Chemical Features of St. Louis Filter Problem, W. F. Monfort, Chemist, Water Dept., St. Louis, Mo.; Remodeled Underdrain System for a Mechanical Filter Plant, Dr. Jesse M. Worthen, Supt. Charleston Light & Water Co., Charleston, S. C.; Miscellaneous Papers; Complimentary Band Concert. 4 p. m., Chapel, University Hall, University of Illinois Military Band, A. A. Harding, Director.

7.30 p. m., Too Much Water (Illustrated), John W. Alvord, Consulting Engineer, Chicago; The St. Louis Rapid Sand Filter Plant (Illustrated), Edward E. Wall, Water Commissioner, St. Louis, Mo.; Rapid Filter Plant at Evanston, Ill. (Illustrated), Langdon Pearse, Div. Engr. Sanitary District of Chicago.

Tuesday, March 10.

10 a. m., Character of Artesian Well Waters in Chicago and Vicinity, C. B. Anderson, Illinois State Geological Survey Urbana; Water Treatment for Railroads, R. C. Bardwell, Chemist Missouri Pacific Railroad, Kansas City, Mo.; Underground Movement of Contamination, Dr. Adolph Gehrman, Consulting Bacteriologist, Chicago; How Centralia's Water Supply was secured, C. D. Tufts, President Centralia Water Supply Co., Centralia; Locating Leaks in Water Mains by Means of Water Hammer Diagram, M. L. Enger, Asst. Prof. Theoretical and Applied Mechanics, University of Illinois; Pumping City Water by Electricity, J. M. Bryant, Asst. Prof. Electrical Engineering, University of Illinois; Relation of Sewer Outfall to Water Works Intake at Quincy, W. R. Gelston and E. Bartow, Supt. Water Works Co., Quincy, and Director State Water Survey, University of Illinois; The Use of the Nitrite Test in Determining the Source of Pollution of a Water Supply, William M. Booth, Consulting Engineer and Chemist, Syracuse, N. Y.; The Addition of Inorganic Salts to Culture Media Employed in Water Analysis, E. M. Chamot, Prof. Sanitary Chemistry, Cornell University, Ithaca, N. Y.

2 p. m., Election of Officers and other business: A Sanitary Survey of White River (Illustrated), Jay Craven, Indiana State Board of Health, Indianapolis, Ind.; North Shore Sanitary District, David H. Jackson, Attorney North Shore Sanitary

Association, Lake Forest; Public Control of Water Supplies in Illinois, Dr. John A. Fairlie, Professor Political Science, University of Illinois; Illinois Public Utilities Commission, Walter A. Shaw, Member of the Commission, Chicago; Sanitary Survey of the Ohio River—An Outline of Work Being Carried on by the Public Health Service, Dr. W. H. Frost, Passed Asst. Surgeon, U. S. Public Health Service, Cincinnati, Ohio; Rates and Their Relations to Meters, F. E. Herdman, Mgr. and Engr. of Water and Light Properties, Waukegan; Surface Water Supplies of Illinois, Paul Hansen and Ralph Hilscher, Engr. and Asst. Engr., State Water Survey; Value of Mathematics in Economic Design of Some Water Works Detail, Harold E. Babbitt, Instructor in Municipal and Sanitary Engineering, University of Illinois; Chemical Standards for the Hygienic Purity of Montana Waters, W. M. Cobleigh, Prof. Chemistry, Montana State College, and Chemist State Board of Health, Bozeman, Montana: 6.30 p. m., Annual Dinner, Beardsley Hotel.

Wednesday, March 11.

10 a. m., Detection of Leaks in Deep Well Tubes by Electric Light, Lloyd Z. Jones, City Engineer, Galva; Standpipe Painting, E. MacDonald, Supt. Lincoln Water & Light Co., Lincoln; The Death of E. Coll and E. Typhosis in Pure Waters, M. E. Hinds and Dr. Otto Rahn, Asst. Chemist State Water Survey and Asst. Prof. Bacteriology, University of Illinois; Filtration Plant at Flint, Mich., R. S. Buzzell, Supt. of Filtration, Flint, Mich.; Relation of Out of Pocket Cost to Rate Making, Morris Knowles and Maurice R. Scharff, Consulting Engineers, Pittsburgh, Pa.; The Iron Removal Plant of the Urbana and Champaign Water Co., Professor A. N. Talbot, Prof. Municipal and Sanitary Engineering, University of Illinois; Necessity for State Supervision of Water Purification Plants, Dr. A. J. McLaughlin, International Joint Commission, Washington, D. C.; The Newly Remodeled Reservoir, John Gaub, Chemist, Filtration Plant, Washington, D. C.; Miscellaneous Papers.

The exhibits of the Associates will be found in Room 220, Engineering Hall. The members of the Association and their guests are invited to visit the Hydraulics Laboratory, the Laboratory of the State Water Survey and the other buildings of the University, and also the new filter plant of the Champaign and Urbana Water Company.

American Highway Association.

The fourth American Road Congress and the convention of the American Highway Association, all its affiliated organizations, and the American Automobile Association has been scheduled for Atlanta, Ga., during the week beginning November 9, 1914.

This announcement, which has been awaited by the various organizations working for better roads, was made in Washington by J. E. Pennybacker, secretary of the American Road Congress. The convention city was selected some time ago, but the date was left open until Mr. Pennybacker made definite announcement in Washington.

It was also announced that in addition to the road organizations committees of the American Bar Association and the American Bankers' Association would work in conjunction with the American Highway Association to make the fourth road congress crystallize the movement for more uniform road laws and a better system of financing road improvement throughout the country.

This will be the first meeting of the American Road Congress in the south and is a recognition of the great energy and progress that has been made in that section in the movement for improved roads. In 1913 about \$40,000,000 was expended by southern states on their public roads, in addition to

the labor of thousands of state convicts. Georgia alone had her entire convict force, numbering nearly 5,000, engaged in road construction.

The tremendous importance of guarding against extravagance in road expenditures is shown by the fact that while a recent report of the Census Bureau indicates that the total bonded debt of the forty-eight states last year was \$419,157,000, in the single year of 1912 the states spent about \$142,000,000 on roads. The total indebtedness had been accumulating for years, and yet in one year an amount equal to about one-third was spent on roads. This subject will be dealt with exhaustively at the coming congress.

One of the principal results hoped for by the management of the congress will be the establishment of state highway departments in the six southern states which have thus far failed to adopt the plan of state supervision, namely, Georgia, South Carolina, Florida, Tennessee, Mississippi and Texas. Aside from these six states, only Indiana and Montana have failed to establish state highway departments for educational or constructive work.

The 1913 American Road Congress was held in Detroit, Mich., with an attendance of about 4,000, representing forty-four states, and with a vast array of exhibits, in which the United States government, many of the states, educational institutions, and over one hundred manufacturers participated. This year it is expected that the congress will have an attendance well over 5,000; and, in preparation for the exposition to be held in connection with the congress, under the direction of Charles P. Light, business manager, the city is preparing to erect temporary structures, covering the entire street space on both sides of the auditorium, and to close to traffic during the entire congress a viaduct extending two blocks. Steps are now being taken toward securing favorable railroad rates, and committees are being formed to provide for the comfort and entertainment of the congress, which will include many of the most distinguished men of the nation.

National Brick Manufacturers' Association.

The annual convention was held at the Grunewald, New Orleans, March 3. The following were elected officers: President, Eben Rodgers, Alton, Ill.; first vice-president, O. P. Mayer, Bridgeville, Pa.; second vice-president, Charles J. Deckman, Cleveland; treasurer, John W. Sibley, Birmingham, Ala.; secretary, Theodore A. Randall, Indianapolis; assistant secretary, A. M. Wallace, Indianapolis.

Among the papers presented was that on "Brick Paved Highways as an Investment," by W. T. Blackburn, Paris, Ill. Mr. Blackburn reviewed the sources and development of the natural wealth and the industry of the United States, and declared that "this development has led up to the demand for more permanent highways connecting

the sources of production with the railroads or waterways which carry those products to their place of manufacture and consumption."

Mr. Blackburn's paper dwelt at length upon the cost of moving products over dirt and paved roads. "The great assets of this country are in its transportation and agriculture," he declared. "One cannot be developed without the other."

American Road Builders' Association.

At a recent meeting of the board of directors, held at Hotel Astor, New York, it was decided that the next annual convention be held in Chicago. The details for arranging the meeting will be in the hands of the executive committee, consisting of George W. Tillson, E. L. Powers and R. A. Meeker.

PERSONALS

Mayor Armstrong, of Pittsburgh, Pa., has appointed the following to the Municipal Art Commission: John W. Alexander, Herman A. McNeil, Henry K. Goodwin, A. B. Orth, A. V. Harlow, W. L. Mellon and John W. Beatty.

Bryson, Carl, Lima, O., has been appointed city engineer by Mayor Roob. Mr. Bryson is a graduate of the Ohio Northern University. He served in the city engineering department of Lima, O., Auburn, N. Y., and has been an assistant of K. B. Allen, consulting engineer, Dayton.

Coy, Burgis G., Fort Collins, Colo., has been awarded the Thomas Fitch Rowland prize of the American Society of Civil Engineers for the best paper presented during 1913. The subject was "The Laramie-Podure Tunnel."

Crosby, Maj. W. W., consulting engineer, Baltimore, Md., delivered a lecture, February 28, before the students in Highway Engineering, Columbia University, on the subject of "Cost Data in Highway Engineering."

Dozier, W. E., has been appointed engineer of Bell county, a new office created for the purpose of assisting in good roads work, advising in bridge matters, etc.

Dyer, Edward, Fulton, N. Y., has been appointed chief of police, succeeding Wm. H. Ross.

Grady, John, senior deputy chief of the Boston Fire Department, has been appointed fire commissioner, succeeding Charles H. Cole.

Harrington, M. T., New York City, has been appointed assistant secretary of the Public Service Commission at a salary of \$3,600 per annum, to fill the vacancy caused by the resignation of William M. Ransom, now judge of the city court.

Henry, Dr. Charles P., Reading, Pa., has been appointed health officer, at a salary of \$2,000 a year.

McDowell, Thomas R., Elk View, Pa., has been appointed superintendent of state highways in Chester county.

Sullivan, Dr. F. A., Haverhill, Mass., has been unanimously elected a member of the Board of Health.

NEW APPLIANCES

G. M. C. FLUSHER.

Electric Machine Saved City of Calgary \$25 Per Day.

The General Motors Truck Company, Pontiac, Mich., manufacture an automobile street flushing machine using a storage battery as the source of power. Two of these machines have performed very satisfactory work in Calgary, Canada, and an account of the machines, with some cost data, is given below. As may be seen from the illustration, the storage battery is placed on the chassis, where it is easy to inspect and take care of. The controller, safety switch, ampere hour meter lamp switches and fuses are all placed under the hood. These points of construction are said to effect a saving in garage charges and floor space. The drive shaft from motor to countershaft on G. M. C. electrics is a patented flexible blade. The shaft is not round but of a thin rectangular cross-section, which will permit flexure. Made of tempered spring steel it minimizes shocks. Increased efficiency of power and less wear of tires is claimed to result from this construction. The G. M. C. controller handle is located above and concentric with the steering wheel.

Referring to the Calgary machines, W. H. Cuddie, superintendent of street cleaning, reported to the mayor and commissioners as follows:

We started the electric motor machines on the 4th of July, but during this month of July the drivers were learning to handle these machines, so did not get them working sixteen hours per day until well on towards the middle of the month; so, leaving out the month of July, I took as a basis the months of August and September.

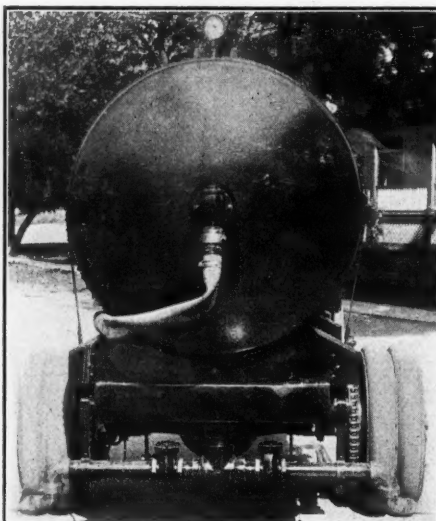
I am pleased to state that the electric motor sprinklers and flushers have given satisfaction in every way during the three calendar months they have been in use.

This department has been able to turn over to the public work general eight teams of horses which have been used on grading machines, enabling the city to get comparatively that much more street graded. The highest day's run for electric motor sprinklers was 42 miles for eight hours; average for the two months, 35 miles per eight hours; average flushing, 15 miles; highest night flushing, eight hours, 19 miles; the actual time working being 33 miles per eight hour day, leaving 2 miles for coming and going from garage, i. e., sprinkling 11 miles three times daily.

Electric motor sprinkles 33 miles of street; horse-drawn sprinkler sprinkles 11 1-5 miles of street; therefore electric motor sprinkler in eight hours does the work of three teams. Electric

motor flusher in eight hours at night washes 15 miles of street; horse-drawn flusher washes 7 miles of street; therefore electric motor flusher in eight hours at night does the work of two teams; therefore the electric motor sprinkler and flusher, day and night, does the work of five teams.

Detail cost of operating each G. M. C. electric sprinkler and flusher:



FLUSHER, SHOWING NOZZLES.

Electricity	\$1.30
Garage charges	1.40
Drivers' wages (one day, one night)	6.00
Rent at \$10 per month .....	.40
Special battery depreciation	1.00

Total

Detail cost of operating each horse-drawn sprinkler and flusher:

Feed, per team	\$0.80
Horseshoeing, repairs to harness, share of stable expenses, etc. .	.50
Drivers' wages	2.90
Depreciation, loss of stock, etc. .	.25

Total

Total cost of running motor sprinkler and flusher per day of sixteen hours	\$10.10
Total cost of doing the same work with five teams	22.25

Each motor sprinkler and flusher saves each day the sum of.....\$12.15
Our two electric motor sprinklers and flushers save the city each day of sixteen hours.....\$24.30

It would require ten teams of horses and equipment to do the same work.

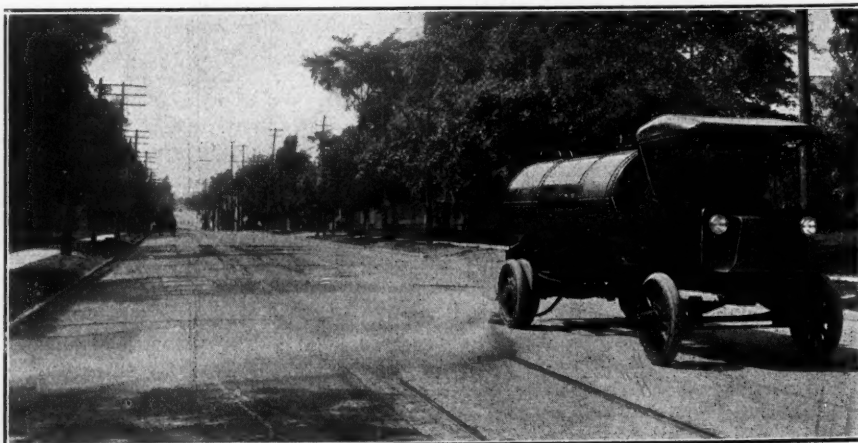
I have not calculated the saving on water in favor of the motor sprinklers and flushers, but, judging from watching the work of both machines, I would say that the motor flusher uses one-tenth to one-eighth less water than the horse-drawn sprinkler or flusher doing the same amount of work.

We are removing water tanks off motor trucks and placing thereon boxes holding six yards of material for hauling snow, etc., off streets during the winter months, and I have no doubt but that each truck will do the work of three teams of horses.

NEVER-SKID.

A Device for Giving Traction and Preventing Skidding of Motor Trucks Having Dual Solid Tires.

The Never-Skid Manufacturing Company, 794 Tenth avenue, New York City, as the result of two years of experimental work, have placed on the market a traction and anti-skidding device for use of automobile trucks equipped with solid tires. The anti-skid chains of the type made for pneumatic tires cannot be used on solid tires on account of the relative unelasticity of solid rubber and the great weight carried. Moreover, the cutting action of the rim flanges prohibits the use of any chain device passing around the tires. A stationary device or ordinary cable chain wrapped around the tire and striking the same spot con-



G. M. C. FLUSHER OPERATING IN CALGARY.

tinuously will cause a deep cut in the tire.

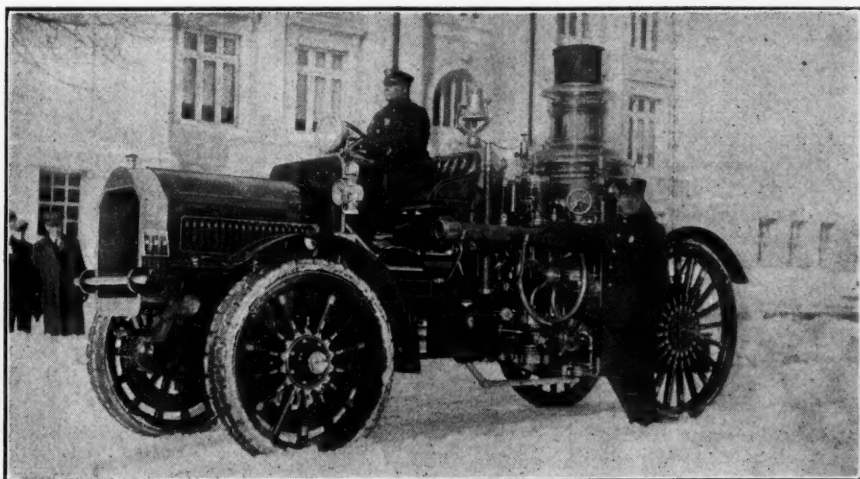
The Never-Skid device consists of a chain passing around the wheel between the two tires and numerous cross pieces which lie flat on the tire, thus causing little vibration. The cross pieces, or frogs, specially treated to give tough wearing qualities, are connected by tested links to form a continuous chain between the dual tires. A link with a turn buckle is provided for taking any slight slack in the chain. The cross pieces move a little on the tire so as to distribute the wear.

Never-Skids have been used on a number of pieces of fire apparatus. The illustration shows it on the aerial truck of the Schenectady fire department, which is drawn by an Alco tractor. The same department has the same device on its three combination chemicals. Chief Yates of Schenectady says that this Never-Skid chain is the best he has seen. Chief F. C. Hoch, of Goshen, N. Y., says it has given splendid satisfaction, it being the third non-skid he has tried and the only one of the three that would hold. Chief W. F. Ingold, of Edgewater, N. J., who uses it on an eight-ton auto engine, says he used them all last winter and they were in as good condition when he took them off as when they were put on.

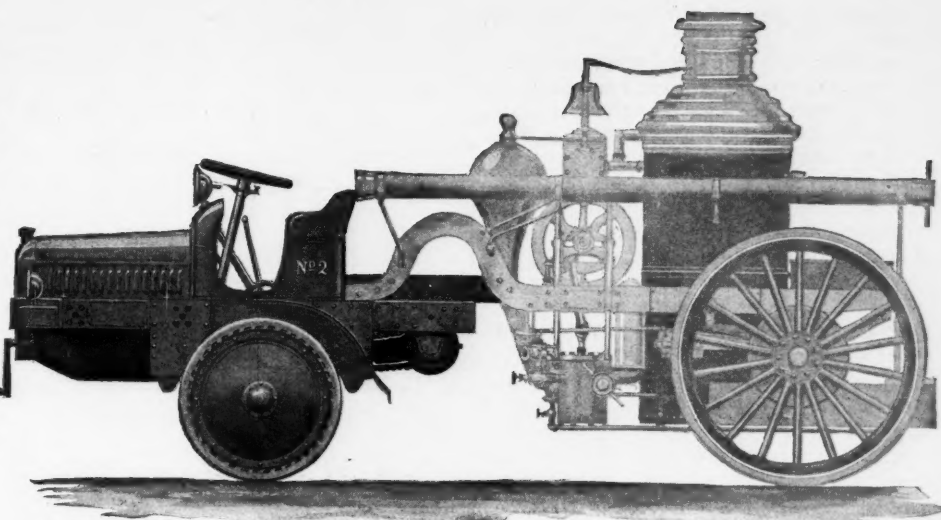
The recent heavy snows in New York afforded the opportunity for many demonstrations of the effectiveness of the Never-skid device. The illustration is that of a United States mail wagon which had been stalled in the snow for eight hours. Never-skids were put on the dual rear wheels and the truck pulled out at once. There were many similar incidents, showing the value of the device.



USING NEVER SKID CHAIN.



LYNN'S NEW TRACTOR AND OLD STEAMER.



CROSS FRONT DRIVE GASOLINE TRACTOR.

CONVERTED STEAMER.

Lynn Steam Fire Engine Equipped With A and B Gasoline Electric Tractor.

Steam engine No. 3 of the Lynn, Mass., Fire Department has been motorized. It is now drawn by a gasoline-electric tractor made by the American and British Manufacturing Company. At the test of the engine made with deep snow on the ground the machine showed great hill climbing power.

The Hoadley system on which the apparatus is built permits quick change from horse drawn to motor traction. With its 40 horsepower motor the engine can be driven at a speed of 25 miles per hour. It is said to climb a 15 per cent. grade at from 3 to 5 miles per hour. The power plant consists of a four-cylinder L head gasoline motor with cylinders in pairs. The main shaft of the engine carries an electric generator which supplies current to driving motors in the front wheels. Each motor and the entire driving gearing is attached to a combination tractive and directive member forming a unit which swings on a pivot for the purpose of steering. Power and speed are controlled chiefly by varying the energy output and revolutions of the gasoline motor by the spark and throttle levers. The controller gives two forward speeds and a reverse.

NEW TRACTOR.

The C. J. Cross Front Drive Tractor Company, 1874 Broadway, New York City, have placed on the market a tractor of the front drive type, which, though made particularly for fire service, being designed and promoted by men who have been active in the fire apparatus business for many years, is presumably adapted for use on any commercial truck. The substantial construction of the machine is shown by the illustration. The points of advantage claimed by the manufacturers are as follows: Almost equal distribution

of the weight on both sides of axle; motor, driving shaft, and transmission placed lengthwise of frame; no bevel gears; double chain drive; all parts standardized and easily accessible; turning angle 38 degrees; double brake system; radiator in front of motor; double seat for two men; left-hand drive, center or right-hand control; timken bearings throughout; steering post at proper angle; electric self-starter and generator.

The tractor was designed by John W. Powelson and Ralph H. Nesmith, both of whom have been intimately associated with the manufacture of motor fire apparatus. The sale will be in charge of C. G. Cross, who has been sales manager for several large fire apparatus companies. Mr. Cross will remain eastern sales agent for the Robinson Fire Apparatus Company of St. Louis, Mo. The initial order for three tractors have been received from the city of New Brunswick, N. J., and two machines will, it is expected, be delivered in the next two months.

ASBESTOS SHINGLES. Fire Prevention Association Would Do Away With Wooden Shingles.

The large number of fires caused by the ignition of wooden shingles has



ROOFED WITH ASBESTOS SHINGLES.

stirred the National Fire Protection Association, of Boston, to issue an illustrated bulletin on the subject, under the title of "The Evil Shingle Roof." This pamphlet does not mince words in arraigning the man who "locks up his valuable papers in a fireproof safe and houses his wife and children in wooden boxes with tinder roofs." The Association urges upon private individuals and corporations the importance of using a non-combustible roof covering, and draws attention to city ordinances in various communities prohibiting the use of wooden shingles.

It points out that burning embers from an adjoining blaze do not constitute the only objection to the wooden shingles, as there is never a day but what some house is burned through the ignition of its shingles by sparks from its own chimney.

It is no hardship upon any class of citizens to compel them to co-operate in public safety. It will not be necessary for any municipality to demand the removal of all shingle roofs immediately. An effective city ordinance may require all roofs constructed in the future to be of incombustible material, and that all roofs which shall hereafter require repair to the extent of one-third of their area, shall be replaced with incombustible roofs.

The photograph reproduced herewith is used by the Association to illustrate a "spark proof" dwelling roofed with asbestos shingles. These shingles, which are known under the trade name of J-M Transite Asbestos Shingles, are composed of two indestructible fireproof materials, asbestos fibre and Portland cement, compressed into a homogeneous mass. It is said that they are practically indestructible, and become even stronger with age. A booklet describing these shingles in detail is published by the manufacturers, the H. W. Johns-Manville Co., N. Y.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago. A number of good municipal contracts are pending. Quotations: 4-inch, \$27; 6 to 12-inch, \$25; 16-inch and up, \$24. Birmingham. Operations are normal with good orders in hand and in sight. Sales have been made to Cuba. Quotations: 4-inch, \$22; 6-inch and up, \$20. San Francisco. There is an increase of inquiries from corporations but municipal business is dull. New York. Private demand is quiet and prices weak. There is but one large municipal contract pending. Quotations: 6-inch, car loads, \$22 to \$23.

Lead.—Quotations: New York, 4c; St. Louis, 3.875c.

Prizes for Highway Study.—To encourage investigation of methods and materials for road and street construction, and to interest engineering students in highway problems, the Barber Asphalt Paving Company has offered prizes of \$100 for the best paper written by a member of the graduating classes of the leading engineering schools. The title suggested is "Asphaltic Materials for Highway Construction." The paper and its conclusions may be based upon service tests and the lessons of experience, the physical qualities or chemistry of asphalt, or it may combine any two of these lines of investigation. The length of the paper is limited to 3,000 words, and all manuscripts must be received not later than June 1, 1914. The purpose of this prize offer is to turn the attention of engineering students to street and road construction as a field of work in which there is great need and great opportunity for trained men.

European Civic Tour.—The Institute of Educational Travel, Inc., Madison avenue, New York City, in affiliation with New York University, has arranged a special civic tour. Robert S. Binkerd, secretary of the City Club of New York, will head the delegation which will be limited to persons who are engaged in administrative work or citizens who are taking an effective interest in the needs of their own communities. The itinerary includes Copenhagen, Berlin, Dresden, Hellerau, Rothenburg, Munich, Ulm, Frankfurt, Cologne, Dusseldorf, Essen, Amsterdam, The Hague, Antwerp, Brussels, Paris, London, Letchworth, Bournville, Birmingham, Port Sunlight and Liverpool. Other places, such as Potsdam, the Rhine, Bonn, the towns of the Zuyder Zee, Versailles, Oxford, Stratford and Chester will also be visited en route.

Trus-Con Waterproofing.—The Trussed Concrete Steel Co., Detroit, Mich., have published a handbook on waterproofing with the title "Trus-Con Waterproofing Handbook," which deserves a place among the highest class of books gotten out by industrial corporations, dealing with their own goods. The book clearly differentiates between various methods of waterproofing and dampproofing, showing the best methods of treatment for special conditions. Integral waterproofing is covered fully with numerous specifications and direction, explaining how mass concrete can be absolutely waterproofed. The various methods of dampproofing exposed surfaces of

concrete stucco, brick and masonry are discussed and various products indicated to insure the most satisfactory results. The troublesome problem of treating concrete floors which have become dusty is brought up, and the remedy suggested. Sanitary washable interior finishes are indicated suitable for public and other buildings. The protection of structural steel is scientifically treated and material indicated to provide against various exposures. A free copy will be sent to persons who will mention their business or professional connection.

Asbestos Roof.—The monthly bulletin of the H. W. Johns-Manville Co. contains an illustration of the Minneapolis Fire Department repair shops. In 1905 this was covered by 12,100 square feet of four-ply Brooks brand of J.-M. Asbestos Prepared Roofing.

Engineering Firm.—J. F. Witmer Company, 2 Chapin Block, Buffalo, N. Y., announce that they have succeeded to the hydraulic and sanitary engineering business of Witmer & Brown. The junior member, A. J. Yeager, was formerly manager of the water works at Lewistown, Pa., and later associated with the National Water Main Cleaning Co.

Water Main Cleaning.—The National Water Main Cleaning Company, 61 Park Row, New York City, have recently been awarded a contract for cleaning water mains at Selma, Ala. The company now has pending contracts for cleaning water mains in North Baltimore, O.; Columbia, S. C., and Salt Lake City, Utah.

Civil Service.

The United States Civil Service Commission will hold an examination April 6 to secure eligibles for the posi-

tion of sanitary engineer in the Public Health Service at salaries of \$2,000 to \$2,500 a year. The duties will consist in research work in the investigation of stream pollution, water purification and the treatment and disposal of sewage and industrial wastes. Application form 304.

Ornamental Lamp Standards.—Municipal authorities throughout the country in charge of city illumination will be interested to hear that the business of the Elmer P. Morris Iron Works, of 136 Liberty street, New York City, has been taken over by the Central Foundry Company, of 90 West street, New York City. The Elmer P. Morris Iron Works has been engaged for a very long time in the production of electric light and gas poles, standards, posts and brackets for use in city streets and in connection with municipal buildings and undertakings, and they have equipment in over 350 cities in this country and Europe. The Central Foundry Company operates seven large foundries throughout the United States, so placed as to provide quick shipping facilities, and they have a very high name for the production of fine quality of iron castings. The sale of the lamp-post standards, brackets, poles, etc., will be continued by the Central Foundry Company under the established trade name of Elmer P. Morris Iron Works at 136 Liberty street, New York City.

It is essential in this work that those selecting posts for city work have at their disposal a wide variety of designs and patterns, so that they may obtain one that is best suited to their special needs. The above companies have met

this demand by offering over 500 designs, covering practically every combination and arrangement. These include poles to carry on the same standard both trolley wires and electric lights, and special poles for the new gas-filled incandescent lamps which will be so extensively used in the next year or two in progressive municipalities. There can be no doubt but that the adequate illumination of its streets largely enhances the attractiveness of any city and brings in new residents and manufacturers, and it is the very best kind of investment that can be made. With this end in view, the Elmer P. Morris Iron Works and the Central Foundry Company, by their large experience in the illumination of city streets, are well equipped to give good advice on contemplated installations. They have a new catalogue in preparation which will soon be published.

Couple-Gear Tractor.—The Municipal Equipment Co., Weightman, Pa., have sold to the City of Trenton for the Couple-Gear Freight Wheel Co., Grand Rapids, Mich., two gas electric, two wheel drive tractors at a price of \$4,500.00 each. One of these is to be used for converting a No. 2 Metropolitan engine and the other an extra first Metropolitan engine. When these pieces are installed it will make three pieces of the Couple-Gear manufacture that Trenton has in service.

Morse Destructor Furnace.—A new destructor furnace is being placed on the market by Wm. F. Morse, consulting sanitary engineer, 90 West street, New York. Mr. Morse has been active in the field of refuse disposal for a quarter of a century or more. Although

formerly connected with several companies making destructors in which his name was used, this is, we believe, the first time Mr. Morse has placed a furnace on the market wholly on his own responsibility. To those who are familiar with this branch of work Mr. Morse needs no introduction or recommendation. However, a few of his business connections may be mentioned: Consulting engineer for city of Buffalo, 1905-6; for Winnipeg, 1907; for Paterson, 1909; for contractor for waste disposal, Boston, 1911; for private company, Halifax, 1912; for American Reduction Company, Pittsburg, 1913. Business connections in earlier years were with the Engle Company, Mel-drum Bros., Animal Rescue League, Boston; Sterling Company, etc. Mr. Morse has also supplied furnaces for the U. S. army and navy.

Sewage Disposal Appliances.—The Sanitation Corporation, 50 Church street, New York City, has taken over the sewage disposal interests of the T. A. Gillespie Co., and the East Jersey Pipe Co., D'Olier sewage apparatus and work and certain successful German sewage apparatus and processes, including the Riensch-Wurl screen. The company will specialize in the manufacture of apparatus for the clarification and purification of sewage, reduction of water contents in sewage sludge and the recovery of by-products from sewage sludge.

Incinerators.—The Burn-All Incinerator Company, Frederick, Okla., have published a booklet describing their system of garbage and refuse disposal. The incinerator is designed to operate at high temperatures. The plans shown are of dome-shaped cells or units.

MUNICIPAL INDEX.

(Continued from page 375.)

Building Heights. Limitation of. Opposition to proposal that Chicago limit be raised to 260 ft.; effect of construction, congestion, New York's experience, sanitary effect and influence on growth of city discussed in protest of architect. 1½ pp., Engineering Record, March 7. 10 cts.

Flood Prevention in China. Disciplining the Hwai River by deepening channel and constructing dams and reservoirs to be undertaken contingent on \$20,000,000 bond issue. ½ p., Engineering Record, February 21. 10 cts.

Ohio Conservancy Law. Flood prevention, drainage and irrigation. Provisions for formation and administration of districts to carry out works to attain these ends. ¾ p., Engineering Record, February 21. 10 cts.

A Study of Reservoir Control as a Means of Flood Prevention at Columbus, O. Ill. 3 pp., Engineering and Contracting, February 4. 10 cts.

Dock Construction. Baltimore's, as compared with that of other ports. Presented by O. F. Lackey before National Assn. of Port Authorities. Ill., 10 pp., Monthly Journal of Engineers' Club of Baltimore, February. 10 cts.

Jamaica Bay Improvement. Deep water entrance, secondary channels, bulkheads, docks and pierheads to be developed and maintained at cost of about \$75,000,000, of which the Government will pay 10 per cent, and New York City the rest. Completion of \$230,000 worth of dredging indicates probability of great ocean freight terminal. Ill., ¾ p., Engineering Record, February 28. 10 cts.

Surface Drainage at Street Intersections. By Paul E. Kressly, city engineer, Englewood, Cal. Ill., 2 pp., Engineering News, March 5. 15 cts.

Explosions in Sewers and Underground Conduits. Data and Discussion on. Or-

dinances, inspection, ventilation and other preventive measures. 2 pp., Engineering and Contracting, February 25. 10 cts.

Tunnels in San Francisco. Highway and Street Railway. By L. E. Torrey. 1½ pp., Engineering News, February 12. 15 cts.

Contract Scandal in Philadelphia. Investigation by committee of three engineers—Allen Hazen, Richard L. Humphrey and Frederick W. Taylor—disclosed irregularities in award and execution of League Island Park construction, begun in 1909. 1½ pp., Engineering Record, March 7. 10 cts.

Unit Price and Lump Sum Contracts and Percentage Work. Paper before American Road Builders' Assn. By H. C. Hill, engineer. 1½ pp., The American City, January. 25 cts.

Fairness in Contracts. Ed., ½ p., Municipal Journal, March 5. 10 cts.

Responsibility in Contract Work. Ed., ½ p., Canadian Engineer, February 19. 10 cts.

Engineers' Estimates and Contracts. Engineer should figure out quantities, limit should be set on amount by which quantity may be increased or decreased. Ed., ½ p., Municipal Journal, February 26. 10 cts.

Hardpan Encountered in Excavation. Result of Contractor's Suit Against U. S. Government to Recover Extra Allowance for. Decision of Engineer as to Classification. By W. B. King, Bar of Court of Claims. ¾ p., Engineering Record, February 14. 10 cts.

A Simple Method of Handling Washed Gravel. Ill., 1 p., Cement and Engineering News, February. 10 cts.

Quickclays in Excavation. Use of Well Points for Unwatering, at Battle Creek, Mich. For pumping station, suction-storage basin and clay pipe supply line in deep cut. 1½ pp., Engineering and Contracting, February 25. 10 cts.

City Engineering Department. The Fee System at Oakland, Cal., of Reimbursing

the City for the Cost of the. 1½ pp., Engineering and Contracting, February 25. 10 cts.

Engineers, Society of. Presidential address of H. Shenton. 5½ pp., The Surveyor, February 6. 15 cts.

Proposed Schedule of Fees. Abstract of preliminary report to Connecticut Society of Civil Engineers of Committee on Code and Ethics. ½ p., Engineering Record, February 7. 10 cts.

Correspondence Courses for Engineering. ½ p., Ed., Engineering Record, March 7. 10 cts.

Testing Flume Needed. U. S. Government. Arguments submitted to Boston Society of Civil Engineers by George F. Swain, Ira N. Hollis and Charles T. Main. ¾ p., Engineering Record, March 7. 10 cts.

City Planning. Ed., ¼ p., Pacific Builder and Engineer, February 21. 15 cts.

Model American City. Ed., ¼ p., American Contractor, February 14. 10 cts.

Market. The Management of a Municipal. By Charles Camp, market master, Cleveland, O. 3 pp., The American City, January. 25 cts.

Municipal Education. Systematic. Ed., ¼ p., Clay-Worker, February. 25 cts.

Iowa University Bureau of Municipal Information. By O. E. Klingaman, chief of the dept., Iowa City. 1½ pp., American Municipalities, February. 20 cts.

Statistical Survey of British Towns. Proposed. 1½ pp., Municipal Journal, London, January 30. 10 cts.

Efficiency at the Source of Management. Ed., ¼ p., Engineering and Contracting, February 18. 10 cts.

Depreciation Plan of the Valuation Committee of the American Society of Civil Engineers. 2½ pp., Engineering News, February 12. 15 cts.

Sanitary Survey of Boundary Waters between Canada and the United States. 2½ pp., Contract Record, February 11. 10 cts.

Eight-Hour Law. Does it Apply? Oregon to find out. ¼ p., Fireman's Herald, January 31. 5 cts.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS				
O.	Grand View Heights	noon, Mar. 14	Grading, draining and paving	B. W. Jones, Vil. Clk., Columbus P. O.
Ill.	Taylorville	Mar. 14	Furnishing material and paving streets, various materials	Board Local Imp.
Kan.	Ottawa	Mar. 15	Improving thirteen blocks	J. W. Hopkins, City Clerk.
Ind.	Indianapolis	10 a.m., Mar. 16	Grading, curbing and paving sundry streets; two jobs	J. A. Rink, Pres. B. P. W.
Minn.	St. Paul	2 p.m., Mar. 16	Grading portions of streets; seven jobs	E. G. Perry, Pres. B. P. W.
Ind.	Kokomo	Mar. 16	Constructing cement sidewalks; three jobs	Board Public Works
Wis.	Chippewa Falls	Mar. 16	Furnishing material and paving with asphalt macadam	Board Public Works
Mass.	Boston	noon, Mar. 16	Grading, surfacing and other road work	Met. Park Comm.
Fla.	Miami	10 a.m., Mar. 16	Building about 27-10 miles county road	F. L. Gates, Clerk.
Ill.	Arcola	9 a.m., Mar. 16	28,000 sq. yds. brick paving on concrete foundation	C. L. James, Engineer, Mattoon.
N. Y.	Syracuse	Mar. 16	Paving; cost, \$16,200	R. D. Roney, Sec. Bd. Contract & Supply.
Mass.	Malden	Mar. 16	Road Improvements	Metropolitan Park Comm., Boston.
N. J.	Westfield	8 p.m., Mar. 16	Improving various streets	C. Clark, Twn. Clk.
Ind.	Fort Wayne	10 a.m., Mar. 16	Grading, draining and paving with stone	C. H. Brown, Co. Aud.
O.	Galion	Mar. 16	7,000 sq. yds. brick pavement, and 1 mile brick with stone or concrete base	H. Hocker, Dir. Bd. Pub. Serv.
Ala.	Luverne	Mar. 16	Improving county road, cost \$10,542	W. S. Keller, State Highway Engr., Montgomery.
La.	New Orleans	noon, Mar. 16	Paving 6½ miles	Highway Dept.
O.	Cadiz	1 p.m., Mar. 16	1.25 miles water-bound macadam; cost, \$7,629	E. P. Hines, Co. Aud.
N. J.	Westfield	Mar. 16	14,000 sq. yds. 6-in. waterbound macadam	C. Clark, Twn. Clk.
Fla.	Lake City	Mar. 16	2,600 sq. yds. reinforced concrete pavement	C. R. Horne, City Engr.
O.	Cleveland Heights	noon, Mar. 16	Grading, paving and reconstructing sidewalks	H. H. Canfield, Vil. Clk.
Mont.	Billings	Mar. 17	18,500 yds. of paving	L. E. Torrence, City Clk.
Ind.	Brookville	1 p.m., Mar. 17	Constructing macadam road	Bd. Co. Comrs.
Wash.	Spokane	Mar. 17	Constructing 26 miles highway	County Comrs.
O.	Sandusky	noon, Mar. 17	Furnishing material and paving with brick	J. J. Molter, Dir. Pub. Serv.
Wis.	Fond du Lac	3 p.m., Mar. 17	Furnishing material and paving with reinforced concrete	Bd. Local Imps.
N. Y.	Buffalo	11 a.m., Mar. 17	Constructing and repairing concrete sidewalk	F. G. Ward, Comr. P. W.
Ill.	Arcola	Mar. 17	Paving approximately three miles of streets	A. Schneider, Mayor.
Ind.	South Bend	Mar. 17	Grading, curbing and constructing walk	Board Public Works
O.	Lancaster	noon, Mar. 17	Furnishing material and paving with vit. brick	J. A. Mayer, Dir. Pub. Serv.
Ill.	Rockford	1.30 p.m., Mar. 17	19,000 sq. yds. brick pavement; 38,000 sq. yds. macadam; 30,000 ft. cement curb and gutter	W. B. Bennett, Pres. Bd. L. I.
O.	Elmore	Mar. 17	Crushed stone	H. D. Dressler, Clk. Benton Twp.
Ia.	Pocahontas	1 p.m., Mar. 17	Road graders, oil tractors and culverts	L. O. Donnell, Aud.
Mass.	Beverly	Mar. 17	Laying granolithic sidewalk; furnishing sidewalk brick, and 9,000 lin. ft. edge stones etc.	Committee on Pub. Service and Aid.
Minn.	Ortonville	10 a.m., Mar. 17	Corrugated metal culverts	A. B. Randall, Aud.
Wis.	Fond du Lac	10 a.m., Mar. 18	One road roller, 2 rock crushers and bin, 1 rock grader, 1 rooter plow, 1 road plow, 3 dump wagons, 3 slip scrapers and 1 sprinkling wagon	A. S. Wilkinson, Co. Clk.
Minn.	Luverne	7.30 p.m., Mar. 18	Combined curb and gutter	S. C. Rea, City Rec.
Ill.	Morgan Park	8 p.m., Mar. 18	25,625 sq. yds. reinforced concrete; 11,800 sq. yds. asphaltic macadam pavement	F. L. Kimmey, Pres. B. L. I.
Ind.	Elkhart	Mar. 18	Two blocks brick pavement	B. I. Bixler, City Clk.
O.	Cleveland	noon, Mar. 18	Paving	A. R. Callow, Comr. Purchases & Supplies.
Ia.	Pella	Mar. 18	37,000 sq. yds. pavement and 2,800 ft. curb	A. C. Aufer, City Clerk.
N. J.	Atlantic City	Mar. 19	Paving 30,620 sq. yds. various materials	Board City Comrs.
Ia.	Monticello	8 p.m., Mar. 19	12,400 sq. yds. paving; 10,350 ft. combined curb and gutter	C. J. Northrop, City Clk.
Wis.	Kenosha	2 p.m., Mar. 20	Furnishing material and making street improvements	Street Assessment Committee.
Ind.	South Bend	7.30 p.m., Mar. 20	Improving boulevard	Bd. Park Comrs.
Fla.	Bradentown	4 p.m., Mar. 20	Improving streets and furnishing 1,250,000 vit. brick	S. C. Corwin, Comr. Pub. Wks.
O.	Cleveland	Mar. 20	Relaying and repairing sidewalks for year	A. R. Callow, Comr. Purchases & Supplies.
N. J.	Elizabeth	Mar. 20	Brick paving on concrete foundation	W. P. Neafsey, Str. Comr.
Minn.	Mora	10 a.m., Mar. 20	Grading, filling and turnpiking	J. C. Armstrong, Boro. Clerk.
Ia.	Marion	Mar. 20	15,000 sq. yds. 6-inch concrete pavement	A. Peterson, Co. Aud.
S. D.	Deadwood	10 a.m., Mar. 20	Excavation for gulch improvement	City Clerk.
Ind.	Green Castle	2 p.m., Mar. 21	Constructing gravel and macadamized highway	B. R. Gustafson, Co. Aud.
O.	Warren	1 p.m., Mar. 21	Improving road	Bd. Comrs., Putnam & Hendricks Counties.
Wash.	Homer	Mar. 21	Paving 4½ miles, various materials	Board Township Trustees.
Minn.	Minneapolis	11 a.m., Mar. 23	Graveling about 29,000 lin. ft. road	County Comrs.
Ia.	Breaux	Mar. 23	Constructing 12,000 sq. yds. cement walks with curbing	A. P. Erickson, Co. Aud.
Fla.	Jacksonville	Mar. 23	Paving two streets	C. C. Rees, Mayor.
Kan.	McPherson	Mar. 23	Asphaltic concrete pavement and curb, cost \$75,000	Board of Bond Trustees.
Ia.	Indianola	7 p.m., Mar. 23	44,000 yds. paving, various materials; also curb and gutter	H. A. Roland, City Engr.
Minn.	Fergus Falls	2 p.m., Mar. 24	Certain road tools and machinery	W. A. Graves, City Clk.
Wash.	Waterville	Mar. 24	Road work; cost, \$25,000	W. Lincoln, Aud. of Otter Tail Co.
Pa.	Harrisburg	Mar. 24	9-foot brick road, 1½ miles	L. T. Griswold, Co. Engr.
Ill.	Princeton	2 p.m., Mar. 24	Paving street	J. P. Upchurch, Co. Supt. Hys.
O.	Newton Falls	Mar. 24	Paving and curbing several streets	Board Local Improvements.
Wash.	Port Orchard	Mar. 24	Improving permanent highway	H. A. Herbert, Vil. Clk.
Wash.	Port Angeles	Mar. 24	Furnishing material and paving various streets	County Comrs.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Mo., Joplin	.....	Mar. 25	Improving street	C. P. Anderson, City Engr.
Conn., New Haven	2 p.m., Mar. 25	25	Paving with various materials on concrete foundation	F. L. Ford, City Eng.
O., Findlay	1 p.m., Mar. 26	26	Constructing water bound macadam road, 4 jobs	Co. Comrs.
Minn., Ada	.....	Mar. 27	Constructing ten miles road	D. F. Fulton, Aud.
N. Y., Albany	1 p.m., Mar. 27	27	Road improvement in several counties	J. N. Carlisle, Comr.
O., Cincinnati	.....	Mar. 27	Constructing concrete sidewalks and road improvements	A. Reinhardt, Clerk.
Ind., Marion	10 a.m., Mar. 28	28	Furnishing crushed stone and road oil	W. T. Patten, Co. Aud.
Ind., Indianapolis	.....	Mar. 28	200,000 gals. road oil, and 400 carloads of crushed stone	City Clerk
Minn., Walker	.....	Mar. 28	Constructing state rural highway, 23.6 miles	I. P. Byhre, Co. Aud.
Ia., Atlantic	.....	Mar. 30	Concrete paving, 50,000 sq. yds.	E. Nicholas, City Clk.
O., Cleveland	noon, Mar. 30	30	Furnishing and delivering composite sand and gravel	A. R. Callow, Comr. Purchases & Supplies.
Cal., Sacramento	.....	Mar. 30	Furnishing material and constructing roads in 7 counties	State Highway Commission.
Wash., Mt. Vernon	.....	Apr. 1	Constructing 3 miles of highway; cost, about \$35,000	Co. Comrs.
Tenn., Nashville	.....	Apr. 1	Paving with various materials	W. W. Southgate, City Engr.
Man., Emerson	.....	Apr. 1	Constructing concrete sidewalk; cost, \$7,000	W. W. Unsworth, Clk.
N. J., Elizabeth	.....	Apr. 1	50,000 sq. yds. bituminous concrete pavement	City Clerk.
Ia., West Union	.....	Apr. 1	28,000 sq. yds. paving, various materials	R. P. Camp, City Clk.
N. D., Bowman	.....	Apr. 6	Grading roads; two jobs	E. R. Fairbanks, Aud.
O., Jefferson	1 p.m., Apr. 7	7	Grading street	Board Co. Comrs.
S. D., Leola	3 p.m., Apr. 7	7	For Galvanized corrugated steel culverts	J. B. Whittmayer.
Ind., Kokomo	.....	Apr. 7	Constructing gravel, brick and stone road in several townships	E. B. Swift, Co. Aud.
O., Niles	.....	Apr. 15	Paving six streets; brick on slag foundation	J. N. Cowdrey, Dir. Pub. Serv.
Pa., Sharpsville	6 p.m., Apr. 21	21	12,000 sq. yds. brick pavement	W. A. Graber, Sec.
N. J., Newton	.....	May 1	Improving 10 miles highway; cost, \$100,000	H. Snock, Co. Engr.

SEWERAGE

Ia., Sioux City	.....	Mar. 14	About 5 miles 9-inch vit. pipe sewer	P. J. Wells, City Clk.
Ill., Rankin	.....	Mar. 15	Constructing 19,000 ft. 8x24-in. sewer, cost \$21,000	J. F. Fisher, Eng., Danville.
Va., Lynchburg	.....	Mar. 15	Furnishing sewer pipe	H. L. Shaner, City Eng.
O., Cleveland Heights	.....	Mar. 16	Sewer construction	H. H. Canfield, Vil. Clk.
N. J., Westfield	.....	Mar. 16	Sanitary sewer construction	C. Clark, Twn. Clk.
Utah, Salt Lake City	10 a.m., Mar. 17	17	Reinforced concrete pipe	Board City Comrs.
N. Y., Rochester	11 a.m., Mar. 18	18	Constructing sewage disposal plant	Sup.
O., Cleveland	noon, Mar. 19	19	Sewer construction; two jobs	A. R. Callow, Comr. Purchases & Supplies.
N. J., Elizabeth	.....	Mar. 20	Constructing terra cotta sewer	W. P. Neafsey, Str. Comr.
Iowa, Denison	.....	Mar. 20	3,500 lin. ft. 6 to 8-inch vitrified pipe sewer extension	H. B. Fischel, City Engr.
N. J., Woodbridge	9.30 a.m., Mar. 20	20	Constructing vit. pipe sewer	A. Keyes, Twp. Clerk.
Minn., Fairmount	.....	Mar. 20	Constructing clay tile ditches	H. C. Nolte, Aud.
Minn., Crookston	10 a.m., Mar. 20	20	Ditch construction; cost, \$14,175	H. J. Welte, Aud.
Mo., Webster Grove	.....	Mar. 23	Constructing sewers; cost, \$20,000	City Clerk.
Tenn., Memphis	noon, Mar. 23	23	Constructing sewer, walls and sheeting for levee	City Clerk.
Tenn., Greeneville	.....	Mar. 24	Constructing sanitary sewers	G. W. Glick, Recorder.
Cal., Mare Island	10 a.m., Mar. 24	24	Furnishing quantity terra cotta sewer pipe	T. J. Cowie, Paym. Genl., U. S. N.
La., Mansfield	.....	Mar. 24	Installing sewerage system	J. W. Parsons, Mayor.
Ind., Richmond	10 a.m., Mar. 26	26	Constructing 2 1/2 miles 12 to 54-inch sewer	F. R. Charles, Eng.
Ia., Council Bluffs	2 p.m., Mar. 26	26	Constructing ditch	J. B. Hannan, Auditor.
Tenn., Memphis	noon, Mar. 31	31	Sewer construction	C. C. Pashby, City Clk.
Neb., Omaha	.....	Apr. 1	Extending outlet of 18-inch sewer; purification works; cost, \$18,000	E. R. Hune, Clerk.
Neb., Dundee	.....	Apr. 1	Extending outlet of 18-inch sewer and sewage disposal works; cost, \$18,000	F. W. Slabaugh, Mayor.
Wyo., Ft. Yellowstone	11 a.m., Apr. 4	4	Constructing outfall sewer	W. L. McLaurn, Quartermaster
Mo., Poplar Bluff	7.30 p.m., Apr. 6	6	Constructing sanitary sewers, cost \$25,756	E. C. Thomas, City Engr.
N. D., Grand Forks	.....	Apr. 6	Lateral sewer	City Clerk.
O., Marion	noon, Apr. 6	6	Constructing sanitary sewer	E. E. Blazer, Clerk.
Ill., Rankin	.....	Apr. 15	Constructing storm and sanitary sewer system	J. W. Shepard, Vil. Clk.

WATER SUPPLY

Ariz., Douglas	.....	Mar. 14	Furnishing quantity of cast iron pipe	City Water Comr.
Neb., University Pl.	7.30 p.m., Mar. 14	14	Furnishing deep well pump	C. Gates, City Clerk.
Cal., Colton	.....	Mar. 15	Constructing 1,500,000 gal. reservoir; cost, \$6,000	N. Davenport, City Clk.
Kan., Anthony	2 p.m., Mar. 16	16	Constructing elevator tank and tower	A. G. Jordan, City Clk.
Ia., Mitchellville	.....	Mar. 16	Constructing water works system	City Council.
Wis., Luck	.....	Mar. 16	Foundation for water tower	A. Pederson, City Clerk.
Ia., Ottumwa	.....	Mar. 17	Constructing two dams and furnishing equipment for power development	I. N. Russell, Dir. Pub. Serv.
Va., Norfolk	10 a.m., Mar. 17	17	Steel tanks	Navy Dept., Washington, D. C.
Ill., Wilmington	.....	Mar. 17	Laying about 11,000 ft. water mains, setting hydrants, &c.	L. Monsen, City Clerk.
Kan., Esbon	.....	Mar. 18	Constructing water system	City Clerk.
N. Y., Buffalo	.....	Mar. 18	Installing water purification plant and chemicals	Comr. Public Works.
Ill., Princeville	1.30 p.m., Mar. 18	18	Constructing system c-i. water supply pipes, with hydrants and valves	B. L. I.
Ill., Morgan Park	8 p.m., Mar. 18	18	2,614 ft. 6-inch water supply pipe	F. L. Kimmey, Pres. B. L. I.
O., Cleveland	noon, Mar. 20	20	Supplying valves, etc.	A. R. Callow, Comr. Purchases & Supplies.
O., Akron	.....	Mar. 23	Improving water works	C. P. Parker, Dir. Pub. Serv.
Cal., Montague	.....	Mar. 23	Constructing water works	A. H. McClelland, Ch. Twn. Trs.
La., Mansfield	.....	Mar. 24	Installing water works	J. W. Parsons, Mayor.
S. D., Huron	2 p.m., Mar. 26	26	Constructing filter	Commissioners.
O., Salem	.....	Mar. 31	Constructing reinforced concrete basin cover	W. E. Baldry, City Engr.
O., Junction City	.....	Apr. 1	Constructing water works, about \$16,000	H. L. Maddocks, Engr., Newark.
Ind., Crown Point	7.30 p.m., Apr. 6	6	Wooden water mains and fittings	H. W. Barry, City Clerk.
Belgium, Antwerp	.....	Apr. 6	High Pressure pumps	Burgomaster.
Ia., Muscatine	.....	Apr. 14	Pumping plant	Co. Supvrs.
Sask., Humboldt	8 p.m., Apr. 15	15	Water works improvements	W. A. Stiles, Sec.-Treas.

LIGHTING AND POWER

R. I., Newport	11 a.m., Mar. 14	14	Underground electric distributing system	H. R. Stanford, Ch. Bureau Yds. & Docks, U. S. Navy, Wash., D. C.
Kan., Manhattan	.....	Mar. 17	Triplex power or motor and centrifugal pump	O. E. Noble, City Engr.
D. C., Washington	.....	Mar. 17	Galvanometers, generators, pumps etc.	T. J. Cowie, Paymaster Gen. U. S. N.
Alta., Wetaskiwin	.....	Mar. 17	Drilling one or two natural gas wells	E. Roberts, Sec.-Treas.
Alta., Calgary	.....	Mar. 18	Two 3,000 k. w., 12,000 volt transformers	Electric Department.
Kan., Esbon	.....	Mar. 18	Electric light plant and water works system	R. Chandler, City Eng.
Minn., Lismore	.....	Mar. 18	Constructing municipal electric light plant	M. Smith, Vil. Recorder.
N. J., Highland Park	8 p.m., Mar. 19	19	Lighting borough streets, optional period	F. A. Metzrath, Boro. Clerk.
O., Akron	.....	Mar. 23	Three 150-hp. water tube boilers, and 1 fuel economizer	C. P. Parker, Dir. Pub. Serv.
N. C., Hickory	.....	Mar. 24	Purchase of franchise for gas plant	J. Mitchell, City Mgr.
Saks, Regina	.....	Mar. 28	Furnishing generating or distributing equipment for electrical department	E. W. Bull, Supt. Lt. & Power.
Pa., Pittsburgh	noon, Apr. 1	1	Electric light plants, etc.	Lieut.-Col. F. R. Shunk, U. S. Eng. Off.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
FIRE EQUIPMENT				
Ariz., Phoenix	Mar. 17	1	Furnishing new apparatus	City Clerk.
Sask., Moose Jaw	Mar. 25	1	motor truck, 2 motor combination chemical and hose cars, 1 75-foot aerial truck, 1 motor triple combination and 1 2-wheel tractor	City Comrs.
Que., Montreal	Mar. 26	1	One pumping engine; one 85-ft. aerial truck; four tractors; two hose wagons and one salvage wagon	J. R. Tremblay, Chief.
BRIDGES				
O., Cleveland	Mar. 14	14	Constructing bridge work	E. G. Krause, Clerk.
O., Lancaster	Mar. 14	14	Constructing sub-structures of bridges	Board Co. Comrs.
Ill., Stockton	2 p.m., Mar. 14	14	Reinforced concrete abutments for two bridges	M. A. Goodmiller, Twn Clk.
Pa., Harrisburg	Mar. 14	14	Reconstruction of highway bridge	W. H. Lynch, Supt.
Utah, Salt Lake City	Mar. 17	17	1,300 ft. reinforced concrete conduit	S. Q. Bannon, City Engr.
Ind., Brookville	11 a.m., Mar. 17	17	Constructing several bridges	Ed. Comrs., Franklin Co.
Neb., Ord	5 p.m., Mar. 17	17	Constructing all bridges for the year	O. Murschel, Co. Clerk.
Ia., Decorah	1.30 p.m., Mar. 17	17	Constructing six bridges	W. R. Shay, Co. Aud.
Pa., West View	8 p.m., Mar. 18	18	Constructing 2 reinforced concrete arch bridges	C. A. McClain, Boro. Clerk.
Wash., Mallott	10 a.m., Mar. 19	19	Bridge construction	F. A. Grainger, Co. Aud.
Neb., Gordon	noon, Mar. 20	20	Constructing all bridges for the year	H. F. Wasmund, Co. Clerk.
O., Columbus	Mar. 20	20	Reinforced concrete bridge	County Commissioners.
Neb., Rushville	noon, Mar. 20	20	Bridge construction for 1914	H. F. Wasmund, Co. Clerk.
Ind., Newcastle	10 a.m., Mar. 21	21	Bridge construction	E. H. Wolfard, Aud.
Pa., Ebensburg	noon, Mar. 23	23	Constructing three reinforced concrete bridges	Comrs. Cambria County.
O., Columbus	noon, Mar. 23	23	Constructing reinforced concrete arch bridge	F. M. Sayre, Co. Aud.
Minn., Winona	2 p.m., Mar. 26	26	Constructing 10 concrete culverts; cost, \$32,865	C. A. Anding, Co. Aud.
O., Cincinnati	noon, Mar. 27	27	Building concrete bridge	A. Reinhardt, Clerk.
O., Hamilton	Mar. 30	30	Constructing Bridges	Board Commissioners.
Ind., Peru	Apr. 1	1	Constructing 120-ft. span bridge; cost, \$8,000	E. McElhaney, Aud.
S. D., Salem	2 p.m., Apr. 7	7	Furnishing galv. corrugated metal culverts for the year	A. E. Ecklein, Co. Aud.
Ore., Gold Beach	6 p.m., Apr. 9	9	Reinforced concrete bridge to cost \$35,000	J. M. Caughell, Co. Sur.
MISCELLANEOUS				
Ga., Bainbridge	Mar. 14	14	Constructing post office	O. Wenderoth, Superv. Arch.
Wash., D. C.				
Minn., Litchfield	10 a.m., Mar. 14	14	30 HP. gas tractor	A. O. Palmquist, Co. Aud.
N. J., Camden	8 p.m., Mar. 17	17	Constructing timber bulkhead	S. Van Hart, Ch. Com.
Ill., Chicago	Mar. 17	17	Steel boiler tubes	Wharves and Docks.
Ill., Chicago	Mar. 18	18	400 street sign posts, 500 brackets, 4,000 name plates	L. E. McGann, Comr. Pub. Ser.
Wash., Seattle	10 a.m., Mar. 20	20	Furnishing pump and electric motor	R. Palmer, Comr. Gas & Elec.
Pa., Pittsburgh	2 p.m., Mar. 20	20	About 18,000 bbls. Portland cement	C. B. Bagley, Sec.
D. C., Washington	2 p.m., Mar. 20	20	Furnishing and delivering 8-ton road roller, tandem type	R. J. Cunningham, Co. Contr.
N. Y., New York	Mar. 20	20	Furnishing and delivering 38,000 bbls. American Portland cement	Commissioners of District.
Ind., Ft. Wayne	10 a.m., Mar. 21	21	Furnishing one 10-ton steam roller and one 600-gallon sprinkler	Col. W. M. Black, Corps Engrs., U. S. A.
O., East Liverpool	noon, Mar. 21	21	Motorized police patrol	Allen Co. Commissioners.
D. C., Washington	10.30 a.m., Mar. 25	25	Furnishing vit. sewer pipe, street lamps, valves, gauges, etc.	N. H. Vodrey, Dir. Pub. Serv.
Panama, Canal Zone	11 a.m., Mar. 28	28	Furnishing four steel towers	F. C. Boggs, Gen. Pur. Off.
Ill., Urbana	Mar. 30	30	Constructing post-office	H. R. Stanford, Chf. Bureau Yds. & Docks, Wash., D. C.
Ind., South Bend	11 a.m., Apr. 6	6	Ten road rollers, and one 20-bbl. sprinkling wagon	Sup. Architect, Treasury Dept., Washington, D. C.
Mo., Richmond	May 1	1	Constructing court house; cost, \$100,000	C. Sedgwick, Auditor.
				J. J. Pardue, Co. Treas.

STREETS AND ROADS

Tucson, Ariz.—Resolutions have been made for improvement of certain streets.

Colusa, Cal.—First block of State Highway Bonds has been disposed of by Supervisors to W. R. Staat & Co. Par value was \$125,000 and they were sold for .9618 of that. Second block will be disposed of on Aug. 1 and last on Dec. 1.

Oakland, Cal.—City Council has directed city engineer to prepare proceedings for oil-macadamizing 39th Ave. from Kanning to Bayo Sts., and also approved of diagram of district to be benefited by improvement of Grand Ave. from Harrison to Cove Ave.

Pasadena, Cal.—Bids have been opened for improvement of McDonald St. and referred to Commissioner Allin as follows: J. C. Kinsman, grading, 55 cts.; curbing, 26 cts.; guttering, 14 cts., and oiling, 55 cts. George Wiegand, grading, 54 cts.; curbing, 25 cts.; guttering, 14 cts., and oiling, 65 cts. J. E. Had-dock, grading, 48 cts.; curbing, 25 cts.; guttering, 14 cts., and oiling, 57 cts.

Red Bluff, Cal.—At meeting of Chamber of Commerce it was decided to launch campaign to raise money for building of State highway through Tehama County. It was estimated that \$800,000 will be needed for the work. Committee will be appointed to arrange for campaign.

San Francisco, Cal.—The Downtown Association has recommended to Board of Supervisors that either asphalt or vitrified brick be used for paving 3d St. from Market to Townsend.

Hartford, Conn.—Public works department has planned for improvement of various streets. The board has asked for \$561,515. Of this large sum, \$40,000 was appropriated for macadamizing, \$47,000 for resurfacing and repairs; \$89,000 for improved pavement and repairs; \$18,000 for bridges; \$10,000 for crosswalks and sidewalks; \$66,400 for

forestry; and about \$73,000 for street cleaning. Streets selected for improved pavement are as follows: Albany Ave., Chestnut to Magnolia, 9,770 sq. yds., \$28,920; Market, from Morgan to Pleasant, 2,760 sq. yds., \$7,925; Talcott, Market to Front, 1,195 sq. yds., \$3,435; Temple St., Market to Front, 3,540; Windsor St., Pleasant to Avon, 3,665 sq. yds., \$10,680. Selected for resurfacing are the following streets: Main St., at Tunnel, 2,260 sq. yds., \$3,480; Main St., east side Charter Oak to Wyllis, 6,200 sq. yds., \$9,548; Trumbull St., Asylum to Church, 2,635 sq. yds., \$4,058; Market St., east side, State to Morgan, 1,950 sq. yds., \$3,000; Asylum Hill, north side, to Garden St., 265 sq. yds., \$408. In addition the department expects to spend about \$6,000 in general repairing and \$2,500 in setting back curbs. On macadamizing council has ordered work done in following streets: Crescent, Capen, north to bend; Holcomb, Vine to hospital; Plainfield; Victoria road, finish west end. The board has ordered the macadamizing of Windsor St., Suffield to Sanford, at an estimated cost of \$4,000, and has recommended the following other streets: Edgewood, Julius, Prospect Ave. and Scarborough.

Wilmington, Del.—At meeting of Park Executive Committee, E. O. Mack, park engineer, was authorized to ask for bids for laying concrete sidewalk at Maryland Ave. triangle and also to ask for bids for laying curb around Boulevard triangle.

Jacksonville, Fla.—Resolutions for asphaltic concrete paving for Riverside Ave., from viaduct to Lackawanna Ave., and for same material for Duval St., from Main to Laura St., have been adopted by Committee on Public Works of Board of Bond Trustees.

Jacksonville, Fla.—Election has been called for voting on issuance of \$650,000 in bonds for highway improvements. If bond issue carries, it will allow hard-surfacing in St. Johns county of about 64

miles of road with vitrified brick and other substances.

Pensacola, Fla.—Arrangements have about been made by City Commissioners to pave two short blocks in business district, that portion of Main St. between Palafox and Tarragona.

Sarasota, Fla.—On March 17 and 26 Manatee County will vote on proposed issue of road and bridge bonds, totaling \$550,000.

Atlanta, Ga.—City engineer will be employed to survey Granite Highway to connect Atlanta with Stone Mountain.

Augusta, Ga.—Ordinance has been adopted for laying down of cement sidewalks on various streets.

Arcola, Ill.—Contract for 28,000 sq. yds. brick paving on concrete foundation, with combined concrete curb and gutter will be let on March 16 at 9 A. M. C. L. James of Mattoon is engineer.

Chicago, Ill.—State Highway Commission will purchase all cement used to build Illinois state aid roads.

Chicago, Ill.—Board of Local Improvements has voted to recommend improvement of Michigan Ave., between North and South Sides.

Chicago, Ill.—Twenty miles of boulevard-like country roads for Cook County have been mapped out for first year's operations under state aid road improvement law. Roads will be of concrete construction, costing about \$12,000 a mile. Distribution of twenty miles of improvement, which is subject to approval of County Board, has been made by Associated Good Roads Organizations. It is as follows, showing lineal length starting at city limits: Western Ave., leading into Blue Island, four miles; Halsted St., leading into Harvey and Chicago Heights, four miles; Milwaukee Ave., leading into northwest truck gardening territory and route of lake-bound motorists, five miles; 12th St., leading into Dupage County, where connecting road is planned, three miles;

Archer Ave. and Joliet roads combined, four miles.

Milledgeville, Ill.—Citizens of Milledgeville and along the Pennington road from Big Mound to Milledgeville, desire that mile of hard road be constructed from top of Big Mound to the Carroll County line.

Springfield, Ill.—Laying of brick pavement in Pasfield St., from Lawrence Ave. to Allen St., has been approved at meeting of Board of Local Improvements.

Evansville, Ind.—Vanderburg county road improvement bonds, amounting to \$20,000, were sold to J. F. Wild & Co., of Indianapolis, at premium of \$135.

Frankfort, Ind.—J. F. Wild & Co., of Indianapolis, were the successful bidders on \$66,700 of Clinton county gravel road bonds.

Hartford City, Ind.—Petition for improvement of Monroe St., under three mile road law, has been granted by Board of County Commissioners at its March session. Paving of Monroe St. will cost in neighborhood of \$15,000, it is estimated. Building of road will necessitate erection of new bridge across Little Lick Creek and will also require unusual amount of grading. Petition asks that improvement start on Kentucky Ave., at the Walnut St. intersection, and run east 1,077 ft. to Monroe St., thence south 9,135 ft. to the Ritter road, south of the city, then east 4,534 ft. to the William gravel road, and also from Monroe St. west 1,066 ft. to Walnut St. Of the total distance 10,215 ft. of the distance is located within the corporate limits.

Indianapolis, Ind.—Board has confirmed resolution for boulevard improvements to be undertaken along Pleasant Run, in East Park District this year. Resolution was modified to provide for construction of boulevard along south side of Pleasant Run from Emerson Ave. to Michigan St., instead of from Emerson Ave. to New York St., as first proposed. Work is also to be done along north side of stream. Estimated cost of land acquisition and construction work is \$80,000.

Indianapolis, Ind.—Resolutions for paving Riley Ave., from Washington to Michigan Sts., and Bancroft Ave., from New York to Michigan Sts., have been confirmed by Board of Public Works. The Riley Ave. work is estimated to cost \$14,461, exclusive of curbing, which it is estimated will cost \$2,436. Bancroft Ave. work is estimated to cost \$7,539. Paving estimates are based on highest priced material, wooden block, as required by law. Resolution for paving Beville Ave., from Washington to Michigan Sts., at estimated cost of \$21,146, has been adopted.

Indianapolis, Ind.—Oiling of unimproved streets is under consideration.

Indianapolis, Ind.—Resolutions for paving streets, estimated cost of which, as prepared by city engineering department, is more than \$200,000, have been adopted by board of public works. One of most important resolutions adopted is that for paving Kentucky Ave., from second alley southwest of South St. to Sand St. Estimated cost of this improvement is \$20,802. Other important resolutions are those for paving Illinois St., from 16th to 21st St., and from 21st St. to Fall creek. Estimated cost for first section is \$20,029 and for second section \$21,411. Effort was made to pave Illinois St. during the last administration, but majority of resident property owners remonstrated. Other resolutions for paving and estimated cost are as follows: Johnson Ave., from Washington St. to the Pennsylvania railway tracks, \$10,740; Broadway, from 38th to 43d St., \$22,320; Arlington Ave., from Washington St. to the Pennsylvania railway tracks, \$7,194; Norwood St., from New Jersey to Alabama Sts., \$5,816; McCarty St., from Meridian to Illinois Sts., \$3,231; 34th St., from Central to College Aves., \$12,498; 31st St., from Delaware St. to Central Ave., \$7,482; Dearborn St., from Washington to New York Sts., \$10,139; from New York to Michigan Sts., \$9,317; and from North to 10th Sts., \$16,382; Rural St. from Michigan to 10th Sts., \$26,493, and DeQuincy St., from New York to Michigan Sts., \$7,621.

Clinton, Ia.—Clinton County's road improvement system has just been definitely outlined by Iowa Highway Commission, and map showing entire system has reached County Auditor Fred Hansen. About 180 miles of road are included in new system. Under provisions of new road law county boards of super-

visors in Iowa have no right to spend county money on any other roads except those included in system, until improvement system of roads is completed, when another system is established. Improvements and construction are all to be under supervision of State Highway Commission.

Des Moines, Ia.—Sum of \$10,000 will be available in 1914 for improvement of highways.

Dodge City, Kan.—Paving of business district has been petitioned for.

Topeka, Kan.—Bids on paving work to be done in city during present city commission. Street and alley paving have been opened by city commission. Street and alley paving to amount of 45 blocks is to be constructed, part of vitrified brick and part of asphaltic concrete. Bids on brick were: Kaw Paving Co., \$53,299.21; J. R. Ramsey & Co., Topeka, \$55,236.75; Capital City Vitrified Brick Co., Topeka, \$51,017.40. Estimate of city engineer on this work was \$51,706.08. Bids on asphaltic concrete paving were: Kaw Paving Co., \$67,399.75; E. D. Tyner Construction Co., Kansas City, Mo., \$68,929.88; J. Jaikes & Co., Kansas City, Mo., \$67,539.37; J. A. Ramsey & Co., Topeka, \$71,645.85; Capital City Vitrified Brick Co., Topeka, \$68,809.30. Estimate of city engineer on this work was \$71,655.33.

Baton Rouge, La.—Colfax gravel will be used for graveling Baton Rouge-Hope Villa mode road, according to contract closed by parish and committee representing good road district with H. B. Helm, general manager of Louisiana Railway and Navigation Co. Parish bought 25,000 yards of gravel for \$22,000, to be delivered at any point in East Baton Rouge Parish.

New Orleans, La.—Ordinance has been passed providing for paving and repaving with square granite blocks river side of Tchoupitoulas St., from 3d to Toledano; space between river side of Tchoupitoulas and Public Belt Railroad tracks; 9th St., from Tchoupitoulas to St. Thomas, and 3d St., from Tchoupitoulas to Rousseau St.

Baltimore, Md.—It is thought recommendation will be made to Board of Awards to give contract for repaving North Howard St., from Baltimore St. to Park Ave., to the Baltimore Asphalt Block and Tile Co., at its recent bid of \$1.98 a sq. yd. for sheet asphalt to be laid on this improvement.

Dighton, Mass.—Sum of \$5,000 has been voted for macadamizing of Pleasant St. and Somerset Ave.

Flint, Mich.—City has planned to lay new pavements on 18 streets, or total of 29,107 ft. Estimated cost, \$195,964.93. Also construction of 13 gravel roads, or total of 9,880.6 cu. yds. Estimated cost, \$18,590.

Flint, Mich.—In addition to paving work, it is contemplated to gravel 13 different roads which constitute main arteries leading into city.

Kalamazoo, Mich.—New roads, either stone or gravel, will be constructed in every township summer of 1914, according to present plans of Commissioner W. M. Bryant. Work will begin about April 1.

Joplin, Mo.—Council bill No. 5112, providing for repaving alley between Virginia and Pennsylvania Aves., from 3d to 5th St., with asphaltic macadam on old base, has been passed, and following resolutions adopted: No. 1012—To pave Ozark St., from 7th St. to the Missouri Pacific Railroad tracks, on Grandview, with class G material. No. 1013—To establish the grade and pave St. Louis Ave., from 4th to 7th St. with class G material.

Omaha, Neb.—Council has approved plans and specifications for thirteen paving and grading districts prepared by City Engineer Beal. Clerk was then instructed to advertise for bids in each one of these districts.

Hampstead, N. H.—Town will vote on appropriating sum of \$1,000 to be expended on permanent improvement of highway on Garden St.

Egg Harbor, N. J.—City Council has ordered plans for street improvements that will cost about \$30,000.

New Brunswick, N. J.—Sum of \$65,000 is required for new paving.

Canton, N. Y.—Bill has been passed authorizing St. Lawrence county to issue \$60,100 worth of bonds to pay for county's share of cost of building roads voted to be constructed, and also to cover expenses of roads heretofore voted to be built, cost of which had not been appropriated. This was in addition

tion to bond issue of \$200,000, previously authorized for same purpose.

Dunkirk, N. Y.—Highway department plans to improve Main Rd. from Cattaraugus county line to Silver Creek and eventually to have that road permanently improved throughout county.

Lestershire, N. Y.—Board of trustees have opened bids for West Main St. pavement bonds. Five bids were received—W. W. Windus of First National Bank of Lestershire making lowest bid.

Long Island City, L. I., N. Y.—Queens Topographical Bureau has completed map reducing width of 46th St. (National Ave.), Corona, from 60 ft. to 50 ft.

Newburgh, N. Y.—Oiling of streets is being discussed by City Council.

Pulaski, N. Y.—Proposition to be submitted to taxpayers on March 17, is one for raising of \$1,000 for stone-crushed roads.

Schenectady, N. Y.—Extension of State St. is being favorably discussed.

Schenectady, N. Y.—Board of Supervisors has adopted resolutions by vote of 13 to 4 whereby eighteen miles of state road are eliminated in Schenectady County and that number of miles added to county system. Roads to be eliminated are these: First—Portion of state route 7-a, from intersection with County Highway No. 163 to Quaker St., where it connects with County Highway No. 105, including section 1, Schenectady-Duanesburg County Highway No. 880, a total distance of 11.5 miles. Second—Road beginning at intersection of road No. 880 near Long's Hotel and running southerly to Blessing's Corners, distance 3.5 miles. Third—Road known as the Church road, beginning at the intersection of the Church road and County Highway No. 577 and running southerly to the county line, distance 1.5 miles. Fourth—Road known as the High Bridge road, beginning on County Highway No. 179, Schenectady-Albany, and running southerly to the county line a distance of 1.5 miles, making a total distance to be eliminated of 18 miles. Roads to be added to county system: First—Beginning at the village line of Scotia on the Sacandaga road and running northerly to the Saratoga County line, a distance of 8 miles. Second—Beginning at the end of County Highway No. 793, Schenectady-Vischers Ferry, and running easterly to the county line on County Highway No. 407, Schenectady-Troy, distance 1.5 miles. Third—An addition to the proposed improvement on the Con-saul road to extend it to the Albany County line where it will connect with the Shakers-Watervliet County Highway No. 879, distance 5 miles. Fourth—Beginning at Pattersonville on County Highway No. 640, and running westerly to the Montgomery County line near Scotch Church, a distance of 3 miles. Fifth—Beginning at Mariaville on County Highway No. 789, running northerly to the Montgomery County line, there to connect with the road proposed to run from Pattersonville, distance 2.5 miles. Sixth—Beginning at Blessing's Corners in town of Princetown on County Highway now on map beginning at Giffords and running northerly to John Giffords' Corner on County Highway No. 577, a distance of 2.5 miles.

Syracuse, N. Y.—For third time in month Board of Contract and Supply has rejected all bids for paving of Tully St. and ordered proposal readvertised.

Raleigh, N. C.—City Council has passed resolution ordering \$100,000 bond issue election for street improvement, principally. Election is called for 15th of April.

Akron, O.—Ordinance has been adopted to proceed with improvement of Vesper St. from North Howard St. to Norwood St. by grading, curbing, paving, constructing 5-ft. sidewalks, constructing water service connections, and by constructing laterals to sewer in said street for house connections.

Cadiz, O.—It has been decided to pave Wheeling and Cadiz pike.

Columbus, O.—Resolution to proceed with re-improvement of High St., from Livingston Ave. to viaduct, and ordinance appropriating \$100,000 to pay city's share of cost, has passed city council.

Columbus, O.—County commissioners have authorized issue of \$100,000 worth of bonds to rebuild four county highways, the Leppert Rd. in Norwich Twp.; the Kilgore Rd. in Madison, Marion and Truro Twp.; the Hall Rd. in Perry and Franklin Twp.; and Watts Rd., which is north end of Sunbury pike.

Sandusky, O.—Further progress has been made by Council in paving legislation. Resolutions of necessity to pave East Scott, Fifth and Meigs Sts. have been placed on their final readings and

approved. Petition of majority of property owners on Scott St., east of Hancock St., asking for pavement, was received. West Monroe St. paving improvement is to be extended 950 ft. west of Mills Creek, according to present indications. Resolution has been passed amending old West Monroe St. ordinance so as to provide for paving 950 ft. further west than was first intended.

Youngstown, O.—Contracts for first of roads to be improved by good roads commissioners during coming summer will be awarded on March 16. Bids have been asked for on these roads and plans and specifications will be ready March 7. The three roads are to be of slag macadam and aggregate length of about 2½ miles. These roads are in addition to contract awarded several weeks ago after money from \$100,000 bond issue became available. Other roads will be selected later. Roads are as follows: The Titusville road, from South Center road eastward toward Titusville station in Boardman Township, 5,194.65 ft.; Salt Springs and town line roads in west part of Youngstown Township, 3,566 ft.; Smith Corners road from Handiwork's Corners east, Austintown Township, 5,887.5 ft.

Eugene, Ore.—First street that will be paved in Eugene this year will probably be 4th Ave. West. Plans and specifications for laying of 5-in. bitulithic pavement on this street have been formally approved and adopted by City Council.

Klamath Falls, Ore.—At meeting held in Dorris it was decided to promote road between this city and Weed, Siskiyou County, Cal. Citizens of Siskiyou County will ask for appropriation of \$120,000 when next they hold bond election to provide for road from Calor to Weed.

Conway, Pa.—Borough council is advertising for bids on grading, paving and curbing on three of principal streets, bids to be opened in council chamber at first meeting in March. Entire job will amount to approximately 5,000 lineal ft. of curbing, 3,000 cubic yds. of grading, and 7,000 sq. yds. of paving.

Ellwood City, Pa.—Ordinance has been passed by council authorizing paving of Franklin Ave. This will make quite improvement in east end of town.

Lebanon, Pa.—Paving ordinance will be considered at next meeting of council.

Pennsylvania.—State Roads Commission has advertised for proposals to oil 48.10 miles of road in Wicomico, Somerset and Worcester counties, requiring 120,845 gallons of oil.

Scalp Level, Pa.—Scalp Level Borough Council has made two important changes in program for State-aid paving of Main St. and improvement of Locust St. Changes are these: Paving of Locust St. will be carried up to No. 37 road, or as far as curbing runs. Paving from Conroy's Hotel to No. 40 road will be brick, instead of macadam, as originally specified by the State. As result of these alterations in plan, new contract, for entire job, will be let. To furnish funds for Locust St. work and town's share of the Main St. improvement, it was voted to have a \$14,000 bond issue.

Williamsport, Pa.—Borough Solicitor Harris A. Spotts and Charles N. Huston, chairman of finance committee of council, have prepared report on borough bonds which are to be issued shortly for paving of Southern Ave., Junction St. and Market St.

Charleston, S. C.—Specifications have been prepared by city engineer for extensive paving operations to be carried out in Charleston during the year, and it is understood that bids will be called for on work first part of this week. It was stated that about 60,000 yds. will be laid. Among notable paving operations to be indulged in this year, and for which specifications have been prepared, with bids soon to be called for, are Meeting St., Broad to Market; Society to Calhoun; King St., Broad to Hasell; Queen St., Logan to Rutledge, and Market St., King to Archdale.

St. Louis, Mo.—Resolution has been adopted for paving and improving Duluth Ave. W. C. Leyse is City Auditor.

Dayton, Tenn.—Election commissioners for Rhea county have set March 31 for election to decide question of a \$250,000 bond issue for purpose of building pikes.

Knoxville, Tenn.—An issue of \$50,000 bonds for improvement of streets of Oakwood lighting municipality, building of sewers and erection of new school building, will likely be decided upon by

citizens of that suburb in election to be held soon.

Knoxville, Tenn.—The Knoxville county road commission has made appropriations for rebuilding Martin Mill pike. Another appropriation has been made for rebuilding of Sevierville pike from Minnis farm to Sevier county line.

Austin, Tex.—Paving of West 8th St., from Congress Ave. to Colorado St., is being considered.

Bartlett, Tex.—Preparations are being made to begin work on gravel roads in this district. Bids were let to Edward Howard of Belton.

Dallas, Tex.—Estimate of City Engineer has been filed for cost of work of paving of Cochran St. from Lamar to Griffin. Creosoted wood blocks are to be used for pavement and work is to be done by Creosoted Wood Block Paving Co. Total cost is to be \$6,659.24, of which city is to pay \$1,614.76, the property owners \$1,622.64, and the Dallas Consolidated Electric Street Railway Co. \$3,421.84.

Dallas, Tex.—By unanimous vote of Board of Municipal Commissioners ordinance was passed ordering widening of Elm St., between Harwood and Central.

Elgin, Tex.—Election held here for voting of road bonds in sum of \$30,000 has been carried by good majority.

Fort Worth, Tex.—Direct road from Springtown to Fort Worth through Azle is being contemplated by merchants and farmers of outlying country. It is planned to have road built by popular subscription.

Galveston, Tex.—Bids for five pieces of new road on mainland have been opened and read and all of them referred to road committee and county surveyor and county auditor for compilation and recommendation. Bids were for League City-Friendswood road, the League City-Kemah road, the Kemah-San Leon road, the Hitchcock-Lamarque road and the Dickinson-San Leon road, and in order named bid of Suderman & Dolson was for shell, \$2.55; concrete, \$18.00 cu. yd.; \$1.72 and \$18.00; \$1.62, \$18.00; \$1.48, \$18.00, and \$1.75, \$18.00. The Central Alabama Construction Co. bid as whole, shell, \$1.80; concrete, \$27.00. F. Freund's bid was \$1.66 and \$29.75; \$1.37½ and \$27.50; \$1.34½ and \$25.00; \$1.35 and \$25.00; \$1.37½ and \$27.50. As a whole Mr. Freund's bid for shell was \$1.41½; concrete, \$27.75. Hanson Sons' (Inc.), bid: \$1.98 and \$16.00; \$1.68 and \$16.50; \$1.63 and \$17.00; \$1.60 and \$17.00; \$1.76 and \$16.50. As a whole, shell, \$1.63; concrete, \$15.25. W. D. Haden's bid: \$2.35 and \$16.00; \$1.55 and \$17.00; \$1.46 and \$18.25; \$1.45 and \$19.00; \$1.61 and \$17.75. No bid for the whole. The Low Construction Co. of Austin bid: \$2.24 and \$13.90; \$1.64 and \$12.90; \$1.64 and \$12.90; \$1.54 and \$12.90; \$1.74 and \$13.90. As a whole, shell, \$1.93; concrete, \$13.30.

Houston, Tex.—Report has been filed recommending roads to be improved from proceeds of sale of \$1,000,070 road and bridge bond issue.

Houston, Tex.—City Engineer Sands has prepared petition for paving of McGowan Ave., from Main St. to Milam St. Engineer Sands will prepare specifications, which call for paving composed of two inches of bitulithic, two inches of sheet asphalt and two inches of Walde asphalt.

Marshall, Tex.—Bond issue of \$300,000 has been voted for good roads.

Snyder, Tex.—Upon petition of 576 citizens the Commissioners' Court of Scurry County has ordered election for April 11 on proposition to issue \$50,000 road bonds.

Terrell, Tex.—Commissioners' Court of this county has called another bond election to vote on issuance of highway bonds in sum of \$300,000.

Ogden, Utah.—Commissioners are planning to pave about 18 blocks this year.

Salt Lake City, Utah.—At informal session of city commission it was decided to pave 3d Ave. from E to N and E from South Temple to 3d Ave. Cost to city will be about \$25,000.

Blacksburg, Va.—Bond issue of \$100,000 is asked for to improve roads in Blacksburg district, this to be spent equitably and to advantage of all sections of county therein embraced.

Centralia, Wash.—Work of paving county road between Centralia and Chehalis will begin as soon as weather conditions will permit.

Tenino, Wash.—It is planned to pave three blocks in business section of either concrete or asphalt.

Janesville, Wis.—City Council has passed orders for street improvement work. St. Lawrence Ave. will be improved with asphalt macadam, gutters and curbing from east side of Park St.

to East St. City will grade and pave with macadam Garfield Ave., from Racine to the north side of Clark St. Paving work will be done on Carrington St., from east side of Main St. to Garfield Ave., with proper grading. Repairs will be made on Court St., from west side of Carrington St. to east side of Garfield Ave., and Ruger Ave. paved and graded from east side of Garfield to east side of Forest Park Boulevard. Gutter and curbing work will be done on Oakland Ave., from Wisconsin St. to Forest Park Boulevard.

Superior, Wis.—Petition is being circulated among owners of property on Ogden Ave., from Belknap St. south to 22d St., asking that City Commission order thoroughfare improved with surface of asphaltic concrete.

Ford City, Ont., Can.—Extensive paving operations will be undertaken by Ford City, Ont., this year, and estimates and plans are now being prepared by Engineer McKay for paving of Maisonsville and Drouillard roads and Edna St. Cost of local improvements may total about \$50,000.

CONTRACTS AWARDED.

Oakland, Cal.—For improvement of Mills St., to Hutchinson Co., at following prices: Grading street, including sidewalk (cutting), 43c. per cu. yd.; grading street, including sidewalk (filling), 43c. per cu. yd.; macadamizing, 10 2-10c. per sq. ft.; curbing with 3"x12" Redwood, 11c. per lin. ft.; gutters of concrete, 14c. per sq. ft.; cement sidewalks, 10½c. per sq. ft.

Sacramento, Cal.—State Highway Commission has opened bids for construction of roads from Daly City to San Francisco and in San Diego for concrete road from Las Flores to western county boundary line. Lowest bid for San Mateo county highway is \$59,925.40, submitted by Bates, Borland & Ayre of San Francisco. State estimated at \$69,076.60 and agrees to furnish \$26,366.55. Taylor and Berlin of Los Angeles bid lowest on San Diego Rd. Estimate was \$65,089 and bid \$74,951. Materials to amount of \$24,354.30 will be furnished by State.

Willington, Conn.—For state road work, as follows: For 5,750 ft. of gravel road on the South Willington-West Willington road, to A. Vito Constr. Corp., of Thompson, at \$8,000.

Alton, Ill.—Special committee of County Board of Supervisors has received and opened bids for construction of new court house for county. Lowest bid was for brick construction, \$165,000, and lowest bid on Georgia marble construction was \$193,900. English Bros. of Champaign was lowest and contract will probably go to that firm. Second lowest bid was offered by Wimmer Construction Co., of St. Louis, \$197,446.

Chicago, Ill.—For constructing concrete curb, grading and paving with vitrified paving brick on 2-in. sand and 6-in. Portland cement concrete, to Citizens' Construction Co. of Chicago, John Dillon, Peter J. O'Brien, John A. McGarry & Co.; also for adjusting sewer catch basins, etc., to Ryan Co., Calumet Coal & Teaming Co., Ready & Callaghan Coal Co., Central Paving Co., James A. Sackley Co., Smith & Brown Co.

East Moline, Ill.—To Central Engineering Co., of Davenport, Ia., at \$77,202, for paving of 16th Ave., by Council.

Hartford City, Ind.—Contract for construction of Shields Rd. has been awarded to W. D. Cook, whose bid of \$5,589 was lowest received. Contract for construction of Ellsworth Rd. has been awarded to C. M. North. His bid was \$5,390.

Laporte, Ind.—Contract for new road to be built on Lincoln Highway at Westville has been awarded to W. F. Smith & Co. Road is to be constructed with crushed stone with binder preparation.

Cherokee, Ia.—Contract has been awarded to Bryant Asphalt Paving Co. of Waterloo, Ia., for about 42,300 sq. yds. street paving and 12,000 ft. of curb, at \$1.66 per yd. Natural Lake asphalt will be used. Laid on 4-in. concrete base, 2 in. top of asphalt. W. Shardlow is City Clerk.

Emporia, Kan.—J. R. Ramsey has been awarded another paving contract in Emporia, when his bid for six blocks of asphalt paving was accepted by Commission.

Topeka, Kan.—For paving as follows: Asphaltic Concrete—to Kaw Paving Co., as follows: 29,906 sq. yds. asphalt concrete pavt. 4-in. base, \$1.35; 3,424 sq. yds. asp. concrete pavt. 5-in. base, \$1.46; 14,050 cu. yds. excav., 35 cts.; 21,118 lin. ft. 7-in. curb and gutter, 42 cts.; 1,443 lin. ft. concrete gutter, 35 cts.; 790 lin. ft.

curb reset, 15 cts.; 38 new catch basins, each \$18; 1,302 lin. ft. 8-in. v. c. p., 40 cts.; 1,505 lin. ft. 10-in., 43 cts.; 1,590 lin. ft. 12-in., 50 cts.; 360 lin. ft. 15-in. 65 cts.; 450 lin. ft. 24-in., \$1.53; 545 lin. ft. 30-in., \$2.38; 7,680 sq. ft. new concrete walk, 11 cts.; 11,175 sq. ft. brick walk relay, 3 cts.; 1 reinforced concrete culvert, 6x12x60 ft., \$1,140; total, \$67,399. Vitrified brick paving awarded to Capital City Vitrified Brick & Paving Co. of Topeka, as follows: 4,558 sq. yds. 18 per cent. 5-in. base asphalt fill, \$1.85; 17,185 20 per cent. 4-in. base asphalt, \$1.50; 1,111 20 per cent. 4-in. base sand filler, \$1.40; 960 sq. yds. 18 per cent. 4-in. base asphalt filler, \$1.75; 9,505 cu. yds. excav., 42 cts.; 8,220 lin. ft. 7-in. curb and gutter, 48 cts.; 8 new catch basins, each \$18; 40 lin. ft. 10-in. v. c. p. 50 cts.; 110 lin. ft. 12-in., 55 cts.; 25 lin. ft. 15-in., 65 cts.; 1,570 lin. ft. new concrete walk, 11 cts.; 7,130 sq. ft. brick walk relay, 2 cts.; total, \$47,358.

Jeffersonville, Ky.—By Board of County Commissioners, contract for improving Luther F. Warder road, in this township, to Thomas F. O'Neil for \$13,700. Only other bidder was Robert Grayson.

Paducah, Ky.—Board of public works has deferred awarding of contract for gravel. T. H. Torian, lowest bidder, agreed to furnish gravel to any part of city for 82 cents per cubic yd. Yancey & Johnson came next with bid of 82½ cents to any part of city. Contractors Gholston, Brooks and Blandford put in bid of 93 cents for any part of city, 84 cents for south side and \$1 for north side. Richard Bell's bid was 85 cents, and 83 cents on south side between Broadway and Island Creek.

New Orleans, La.—To Barber Asphalt Paving Co., Philadelphia, for paving with hot lake asphalt Lowerline St., from Commercial to Esther Sts.

Springfield, Mass.—For material needed for streets for 1914, as follows: 10,000 bbls. cement, at \$1.90 per bbl., to W. F. Cook Co., Springfield; 10,000 vds. wood block, at \$1.90 f. o. b. Springfield, to Warren Bros. Co., Boston; 10,000 vds. granite block, at \$1.54 f. o. b. Springfield, to Hildreth Granite Co., Boston; 43,000 ft. salt glazed pipe, at 66 per cent. off list, to M. A. Maynard of Springfield; 40,000 tons broken stone, at 85 cts. to \$1.05 f. o. b. Springfield, to John S. Lane Co., New Haven, Conn.; and 10,000 ft. curb stone, at 49 cts. and 56 cts. f. o. b. Springfield, to Hildreth Granite Co., Boston.

Camden, N. J.—To Warner, Quinlan & Co., of New York City, at \$15.45 per ton, for furnishing of raw asphalt.

Springfield, N. J.—Bids for furnishing crushed rock to use on township streets have been received from Commonwealth Quarry Co., Stuart Hartshorne and the Bamberger-Chapman Co. by Township Committee. The bid of Stuart Hartshorne for 1½-inch stone, the kind generally used in township, was 70 cts. per ton, as against 85 cts. per ton for same grade by each of others, and contract will probably be awarded to him.

Wildwood, N. J.—By Wildwood City Commissioners contract to repave Pacific Ave. from Cedar to Pine Ave. to Richard B. Newton, of Trenton.

Albany, N. Y.—The following were the low bidders for construction of public highways by state aid at the letting March 6th: Road No. 5418, H. E. Dillon, Olean, N. Y., \$59,999.90; No. 1112, Bridgeport Const. Co., Poughkeepsie, N. Y., \$22,283.15; No. 1113, Russo-Parker Const. Co., Hudson, N. Y., \$56,423.33; No. 1017, J. D. Moynihan, Tahawus, N. Y., \$91,501.35; No. 5369, Bridgeport Const. Co., Poughkeepsie, N. Y., \$26,943.50; No. 835, Spellman-Oliver Co., Chateaugay, N. Y., \$66,816; No. 829, Pat H. Murray, Rochester, N. Y., \$40,901.85; No. 5447, Newport Const. Co., Herkimer, N. Y., \$39,231.40; No. 760, Kedian & Truesdale, Barnard, N. Y., \$28,310; No. 810, Frank B. Brotsch, Rochester, N. Y., \$5,807.20; No. 5437, Chambers & Barnes, Rochester, N. Y., \$38,559; No. 5444 Jackson Bros., Cuddebackville, N. Y., \$55,121.25; No. 5446, Pat H. Murray, Rochester, N. Y., \$99,042.30; No. 5301, Shaughnessy Const. Co., Albany, N. Y., \$148,495; No. 5371, Newton Paving Co., Trenton, N. J., \$34,324.50; No. 5361, Alfred Price, Richfield Park, N. J., \$22,606.70; No. 5362, John O. Weston, Yonkers, N. Y., \$5,929.20; Nos. 5022 and 5148, T. H. Gill, Great Bend, Pa., \$8,232; No. 946, McGreevey, McGuigan, Elmira, N. Y., \$4,198.64; Nos. 5072 and 5073, Jackson Bros., Cuddebackville, N. Y., \$10,103.90; No. 14, Flood & Van Wirt, Hudson Falls, N. Y., \$7,339; No. 233, Flood & Van Wirt, Hudson Falls, N. Y., \$10,746.75; No. 459, Phelan & Sullivan, Utica, N. Y., \$37,056; No. 5036, Burns & McConville, Ogdensburg, N. Y., \$4,045; No. 276, Thomas Hucknall & Co., Albion, N. Y., \$10,030; No. 3, R.

B. Kennedy Const. Co., Utica, N. Y., \$7,255.99; No. 607, Monroe Roads Co., Pittsford, N. Y., \$29,044; Nos. 5008 and 5111, Federal Asphalt Co., Newark, N. J., \$26,940.60; No. 993, Harry B. Harrison, East Rochester, N. Y., \$3,310.50.

Ilion, N. Y.—At joint meeting of Board of Trustees and Board of Street Commissioners, contract for paving Second St., from Otsego St. to Barringer St., about ¾ of a mile in length, with bituminous pavement, was unanimously awarded to Warren Brothers Co., at their bid of \$38,044.

Saratoga Springs, N. Y.—Contract for building of State roads on north and south of Saratoga Springs has been awarded to William G. Fox of Saratoga Springs for \$22,476. Highways to be built are on Maple Ave. and South Broadway and will connect village with State highways. Mr. Fox also secured contract for building road 418 between Lake George and Bolton Landing for \$11,375. Mr. Fox was also bidder for Glens Falls-Lake George highway. His bid was \$6,980, while lowest bid was \$6,918, made by Joseph Walker of Saratoga. Bids for improving the Saratoga Springs highway were as follows: William G. Fox, Saratoga Springs, \$22,476; Amos D. Bridge Sons, Hazardville, Conn., \$28,819.50; William H. Gailor, Saratoga Springs, \$25,733.50; John B. Dower, Ballston Spa, \$23,773; Laing & Horton, Schuylerville, \$27,468.50; Flood & Van Wirt, Hudson Falls, \$26,840; B. Gaffney & Son, Saratoga Springs, \$26,822; Thomas Leonard, Saratoga Springs, \$24,753; S. V. R. Malcolm & Son, Medina, \$26,649.50; W. L. Lawton, Glens Falls, \$28,404; Schenectady Contracting Co., Schenectady, \$25,617.

Akron, O.—For paving of North Case Ave., contract was awarded to William Lee on his bid of \$16,005.50.

Portsmouth, O.—To W. L. Odle, of New Boston, at \$4,800, for grading of Harrisonville Pike.

St. Paul, O.—For about \$30,000 paving in St. Pauls to Brewer, Tomlinson & Brewer of Chillicothe.

Toledo, O.—Bids have been accepted by county commissioners on materials for road repair. Bids were separately on each road as delivery charges vary. Bids on broken limestone were accepted from following: France Stone Co., ranging from 75 cents a ton to \$1.25; Toledo Stone & Glass Sand Co., 75 cents to \$1; Higgins Stone Co., 80 to 85 cents; Whitehouse Stone Co., 60 cents to \$1.32. Accepted bids on limestone screenings were: France Stone Co., 60 cts. to \$1.15; Toledo Stone & Glass Sand Co., 65 cents; to 90 cents; Siggins Stone Co., 88 cents; Whitehouse Stone Co., 60 to 85 cents. Bids accepted for bituminous binder were: Barber Asphalt & Paving Co., \$1.58 a gallon; H. P. Streicher & Co., \$1.09; Standard Oil Co., 9 cents; Continental Bitumen Co., \$0.85 to \$1.09.

Chester, Pa.—The Sun Oil Co., whose plant is at Marcus Hook, was lowest of five bidders for supplying city of Boston 400,000 gals. of road oil. When bids were opened Sun Co. was found to have named its price as 5¼ cents a gal.; Standard Oil, 5½ cents; Indiana Refining Co., 5½ cents; G. F. Whitney Company, 6 cents; Hoadley Good Roads Co., 7½ cents.

Philadelphia, Pa.—To Union Paving Co., 30th and Locust Sts., at \$205,815, for Schedule A. repaving and patching asphalt streets.

Providence, R. I.—Board of Contract and Supply has awarded contract for road oil to Texas Oil Co. It is under contract to furnish 250,000 gallons at 4 cts. a gallon at city yard. Other bidder was Standard Oil Co. of New York.

Fort Worth, Tex.—Contract for paving Paddock viaduct on North Main St., over Trinity River, has been awarded by County Commissioners to McKinzie Construction Co. and work will be commenced as soon as material can be assembled. Materials used will be 4-in. brick and bid was \$1.41 per yd. for 7,500 yards, a total of \$10,687.60. Bids were unusually close, four received ranging from \$1.41 to \$1.44½, as follows: McKinzie Construction Co., \$10,687.60; Kuhlman & Blue, \$10,801.50; Tarrant Construction Co., \$10,839.40; and General Construction Co., \$10,953.10.

Galveston, Tex.—Bids have been opened for shelling and grading 2.8 miles of road between Caplen and Gulfview on Bolivar peninsula and for car load of iron culvert pipe to be delivered at Dickinson. There were two bidders for road work and ten for pipe. Bids for road were as follows: R. C. Bouse, shell, \$1.55 per cu. yd.; grading, \$90 a mile; sand, 35 cts. cu. yd. W. D. Haden bid \$1.43 for shell, \$134 a mile for grading and 59 cts. a cu. yd. for sand. This piece of road is

2.8 miles in length and calls for approximately 5,000 cu. yds. of mudshell containing not over 15 per cent. mud or other foreign substances. It calls for 630 cu. ft. of sand filling to bring the road to uniform grade; the road is to be 30 ft. in width, the shell is to be sward over the surface to a depth of 8 ins. at the center and 6 ins. at the side and be 12 ft. wide. Contract was awarded to W. D. Haden, at \$7,896.90.

Olympia, Wash.—To P. J. McHugh of Seattle, contract for building summit stretch of Sunset highway through Snoqualmie Pass, by the Highway Board. His bid totaled \$203,696. Stretch is four miles on east side of summit, beginning at Lake Keechelus and running west, and 20 miles on west side of summit, and when completed will be connecting link between east side and west side through Snoqualmie Pass.

Seattle, Wash.—Park Department and Engineer's Department will recommend to Board of Public Works that the contract for paving Division 1 of Queen Anne Boulevard be awarded to the Barber Asphalt Paving Co., on their bid of \$27,751.85 for asphalt with paint coat. Proposal on contract for reconnecting existing trestle on Railroad Ave. and planking same will be considered. The Engineer's recommendation is that work be given to J. A. McEachern & Co., on a bid of \$54,035.16.

SEWERAGE

Gadsden, Ala.—Bond election for the purpose of extending sewer system, especially in West Gadsden and other outlying sections, will be held April 20.

Hanford, Cal.—Hanford's \$8,000 sewer bond issue, voted more than a year ago, has been sold to Chicago bond buyers at premium of \$800 and accrued interest.

Sacramento, Cal.—Preliminary steps toward installation of general sewerage system for annexed territory at more than a million dollars have been taken by City Commission at instance of City Commissioner E. M. Wilder, head of Public Works Department.

Sacramento, Cal.—City has disposed of \$200,600 4½ per cent. sewer and drainage bonds to Capital National Bank. Proceeds of bonds will be used in construction of Sutterville levee, and of pumping station, which will carry drainage water into river.

Sacramento, Cal.—Approximately \$20,000 worth of sewer and drainage bonds will be sold over counter under order of City Commission, and most of money will be used to pay for construction of Sutterville levee, contract for which has been let to F. E. Fry.

Vallejo, Cal.—City will vote on \$142,000 for extension of sewer system and harbor improvements.

Bridgeport, Conn.—Plans for new trunk sewer to be built on East Side in conformity with recent order of Superior Court to prevent emptying of any sewage into Pequonnock River, between Berkshire bridge and Congress St., have been prepared by force in city engineer's office, and call for sewer 4,000 ft. long to follow Knowlton entire length and to be 36 or 39 inches in diameter.

Newark, Del.—Newark Sewer Commission has been authorized by town authorities to borrow \$4,500 additional for sewers.

Augusta, Ga.—Ordinance has been adopted for construction of various sewers. W. L. Martin is Clerk of Council.

Macon, Ga.—City of Macon will pay 21 per cent. of cost of building sewer through property of Suburban Realty Co. in West Vineville, according to decision reached by Council. Total cost will be \$10,000.

Freeport, Ill.—Freeport is about to install sanitary sewer system for south end of city extending from end of 15-ft. sewer at Grand and Blackhawk Sts.

Fort Scott, Kan.—Council has decided to go forward with construction of septic sewerage tank at cost of \$25,000.

Paducah, Ky.—The Hospital, Sewer and Sanitary Committee of General Council has instructed City Engineer L. A. Washington to draw plans for Sewer District No. 3, as members of Council proposed to begin work on sewer coming spring. At end of year there will be \$60,000 available for sewer, which will cost approximately \$200,000. A fund was created for sewer, \$30,000 being placed in it last year and \$30,000 appropriated for it this year.

Baltimore, Md.—Sewerage Commission has asked for bids for lateral sewers and house connections in one of sanitary dis-

tricts. Contracts call for 29,500 lin. ft. of vitrified sewer pipe, 10,500 lin. ft. of vitrified house connections.

Rockville, Md.—Construction of sewerage system is planned.

Rockville, Md.—Construction of pure water supply system is being planned.

St. Paul, Minn.—Board of Public Works has adopted favorable report on order for Terry-Griffith sewer system. Its estimated cost is \$67,890, of which Council has appropriated \$15,000 from main sewer fund.

East Orange, N. J.—Ordinance has been passed to provide for bond issue of \$25,000 for construction of surface water drains.

South Orange, N. J.—Resolution has been adopted for construction of various sewers.

Fredonia, N. Y.—Taxpayers will vote on March 9 on proposition to spend about \$100,000 for improvement of village sewerage system.

Oswego, N. Y.—Special election to decide whether or not sewer bonds aggregating \$110,000 shall be issued by city for continuance of sewer system will be held in rotunda of City Hall on March 25.

Rochester, N. Y.—Work on plans for final part of sewage disposal system is well under way, and specifications for pumping plant to be located on east bank of Genesee river to care for sewage of lower Lake Ave. section, are nearly completed.

Marion, O.—Ordinance has been adopted by Council providing for construction of sanitary sewer on Davids St., from Bellefontaine Ave. to Center St., and storm-water sewer and cellar drain from Bellefontaine Ave. to Columbia St., there to empty below brick arch sewer. According to plans, sanitary sewer is to be of 8-in. tile from Bellefontaine Ave. to Buckeye St., 10-in. tile from latter street to Columbia St., and 12-in. tile from Columbia St. to Center St. Length of sewer is 5,240 ft., just 40 ft. short of being a mile.

Urbania, O.—County Commissioners have approved engineer's report on Johnson Ditch in Salem Township, and have ordered work sold on March 14.

Providence, R. I.—Resolutions have been passed to construct sewers in following streets: North Main St., from a point about 100 ft. north of Cemetery St. to Frost St.; right of way across land of Swan Point Cemetery, from Lorimer Ave., near Methyl St. to Blackstone Blvd.; Cass St., from Rugby St. to Broad St.; Morton St., from near Eddy St. to Broad St.; Franklin St. extension, from Westminster St. to Hoyle St.; Ash St., from Hilltop St. to Staniford St.; Metcalf St., from Branch Ave. to Grafton St.; Grafton St., from Metcalf St. to Silver Spring St., and Hope St., from John St. to about 100 ft. northerly.

Dallas, Tex.—City Secretary has been instructed to advertise for bids for 6-inch sanitary sewer, with laterals, in Hall St. from Ross to Knight. Approximately 1,200 ft. of main and 1,520 ft. of laterals will be required. Estimated cost is \$1,677.

Dallas, Tex.—Board of Municipal Commissioners has passed ordinance calling general city election for Tuesday, April 7. City Attorney O'Donnell has completed ordinance submitting question of issuance of \$600,000 school bonds and \$50,000 sanitary sewer bonds. This ordinance will be passed by board and question of issuance of these bonds will be voted upon at this election.

Racine, Wis.—People on north side are urging construction of trunk sewer.

CONTRACTS AWARDED.

Chicago, Ill.—See Streets and Roads.

New Orleans, La.—To Herndon & Pearce for installing subsurface drains, etc., in connection with paving of Lorierline St., from Commercial to Esther Sts.

Baltimore, Md.—Lowest bidder for sanitary sewer contract No. 131 was Carrozza Bros. & Co. of Baltimore, at \$80,800.

Kellher, Minn.—For approximately 2,900 ft. 8-in. sewer main and construction of disposal plant from plans of T. Milton Fowble, 34 Union Block, St. Paul, to H. L. Bosworth, of Ada, at \$4,475.

Manato, Minn.—To A. Bashaw, at \$7,000, for construction of storm sewer on Vine St., thence to 4th St., thence along 4th from Vine to Lafayette St.

Akron, O.—For construction of McNaughton St. storm sewer and retaining wall, to Matthew McCourt on his bid of \$978.18.

Canal Dover, O.—To Harry Steltz contract, at \$487.05, for constructing short storm sewer line in E. Front St., from Canal Rd. to Cross St., and in Walnut St., from canal bank in W. Front St. and W. Second St.

Lancaster, O.—To Wilson & Bower, of Athens, O., at about \$12,000, for installation of storm sewers, by Council.

Chattanooga, Tenn.—By City Comm. to McIsaac & Gentry, for constructing sewers in 11th Ward, at \$13,081.

Houston, Tex.—To Horton & Horton, of Houston, for constructing storm sewer on Holman Ave., at \$13,400, and to Bailey-Reeder Co., for lateral sewer on McKinney Ave., at \$16,700.

Sheboygan, Wis.—By board of public works contracts for constructing sewers as follows: S. Seventh St., 385 lin. ft. 18-in., 350 lin. ft. 10-in. pipe and 4 manholes, Peter Borst, Port Washington, Wis., \$846.25. N. Fourth St., 270 ft. 10-in. pipe and 2 manholes, August Vowinkel, Sheboygan, \$331.

Bassano, Alta.—For constructing sewer system to Bennett-Debnun & Co., Calgary, \$10,275. Other bidders were: John H. Turner, Calgary, \$10,590; Lees & Bigler, Edmonton, \$11,017; G. A. Sisson, Bassano, \$10,750; Gedney-Gray Co., Bassano, \$12,982, and Hotson, Lender & Good, Medicine Hat, \$11,960. Geo. B. R. Bond is City Secy-Treas.

WATER SUPPLY

Clanton, Ala.—Citizens, by vote, have decided to issue bonds to amount of \$25,000 for waterworks improvement. Work will commence soon and pushed rapidly towards completion.

San Francisco, Cal.—Public Utilities Committee of Supervisors has approved resolution requesting City Engineer to prepare plans and specifications for sinking wells and laying pipe to supply outlying districts which need water.

Yreka, Cal.—Town Trustees of Yreka have ordered plans and specifications prepared for laying of more than 4,000 ft. of new water mains preliminary to paving principal street.

Wilmington, Del.—Bonds in sum of \$50,000 will be sold and funds used to purchase and install meters.

St. Petersburg, Fla.—City Council of St. Petersburg is considering measure appropriating \$25,000,000 for supply of pure water, to be drawn from Lake Ladoga, 40 miles away. On reaching Ladoga pumping station water will be driven into reservoirs and filters, whence it will flow through pipes unaided to capital and there distributed. Capacity of works, which will be ready in 1920, is calculated for population of 4,500,000.

Springfield, Ill.—Extension of water main to Bergen Park, new pleasure ground east of city, is proposed in return for further donation by Park Board for building of sewer which is to divert sewage from lake in Bunn Park where bathing beach is to be installed. This proposition will be made to Board at its next meeting. Ordinance that is submitted to Council by Commissioner Hamilton provides that Park Board pay \$2,000 and city \$13,000 of expense of building Bunn Park sewer.

Indianapolis, Ind.—Extension of water service to Beach Grove is being considered.

LaPorte, Ind.—Installation of water meters in business section of city is planned.

Beverly, Mass.—The Water Commissioners have advertised for bids for furnishing of department under workmen's compensation act. Bids are asked for insurance covering estimated wages of \$3,000 on construction of mains and service, \$10,000 for maintenance, \$6,500 for pumping station and workshop, and \$100 for blasting for construction work.

Mansfield, Mass.—Principal topic under discussion is project which has been placed before water district, namely, building of mammoth reservoir on Foolish Hill, Foxboro, and several improvements at water station, all of which if voted favorably will necessitate bond issue of about \$75,000. Matter will be decided by water district in town hall March 17.

Hibbing, Minn.—A project for Hibbing's future water supply that, if accepted, will give village splendid service, has been outlined to Council by Earl B. Jackson, expert consulting engineer, who spent considerable time in survey of country north of so-called "Divide." Two propositions are outlined. One is based on area including Rock, Dav and Butchart's lake, with pumps at each body of water, suitable dams, large filtering plant and reservoir at Rock Crusher hill and pipe line sufficient to carry 4,000,000 gallons of water a day. Estimated cost of this system would be \$651,000. Plan that was apparently favored by engineer and seemingly met with approval of Council started at Sturgeon lake, with pipe line to Rock lake where emergency plant would be located and used same

scheme of filtration on Rock Crusher hill. Cost of this system is estimated at \$950,000.

Billings, Mont.—Part of this year's appropriation will be used to lay pipe line from Gray Eagle ditch to south side municipal swimming pool. Project will require 1,800 ft. of pipe, and when completed will provide constantly fresh supply of water.

Niobrara, Neb.—For construction of new waterworks system to George L. Vlasnik, formerly of Niobrara.

New Brunswick, N. J.—New Brunswick's Board of Water Commissioners will take definite steps to erect stand-pipe for use throughout city and Highland Park. Cost, \$20,000.

Perth Amboy, N. J.—Establishment of salt water pumping plant for high pressure is being considered.

Buffalo, N. Y.—Board has authorized \$250,000 bond issue for construction of Venturi meter and valve house, repair of engine No. 6 at pump-house, construction of pump wells, purifying and feed water system and remodeling of storehouse on Lakeview Ave.; also \$337,000 to retire water bonds that come due soon.

Ithaca, N. Y.—Board of Public Works has decided on its annual budget, necessitating \$78,000. Repairing and improving streets will require \$29,200 of this and sewers \$10,500. Separate account for Water Department includes \$26,850 for installation of meters throughout city and improvements to filtration plant.

Lyons, N. Y.—Special election held in this village to vote upon proposition of purchasing franchise and plant of Lyons Water Works Co. for \$25,000 has been carried.

Columbus, O.—Installation of water meters in both in-take and out-flow pipes by companies using water from state canals, probably will be principal recommendation of hydraulic water rates which John I. Miller, superintendent of public work, expects to make next week, following survey of state canal system, particularly about Akron.

Dayton, O.—Bids have been opened in office of Finance Director Hugh Wall for pipe for waterworks department, total contract involving approximately \$15,000. Bid of United States Cast Iron Pipe & Foundry Co. aggregates \$14,685, and that of American Cast Iron Pipe Co., \$14,981.25. Other bidders were Central Foundry Co. of Chicago, R. D. Wood & Co. of Philadelphia, and Jas. E. Clow & Sons of Chicago. Bids will be classified by engineering department and then submitted to City Manager Waite, who will make award.

Dayton, O.—S. G. Pollard of Cincinnati, who was employed some time ago to make special survey of waterworks department, has reported that he had completed preliminary draft for new pump to be used in connection with new wells near Tate's Hill, several miles east of city.

Toledo, O.—Needed extensions and improvements in water mains and equipment that would cost approximately \$250,000 have been indicated and recommended by Superintendent of Waterworks Goodwillie. Blue print plans of proposed extensions and enlargements of lines running to East and West Toledo and new and larger main to supplant Hawley St. line, have been delivered by Mr. Goodwillie to Service Director Boardman.

Eugene, Ore.—Eugene City Council has opened several bids on \$100,000 water extension bonds and referred them to finance committee. It is plan of water board to build two new reservoirs and lay several miles of new mains.

Eugene, Ore.—Bid of R. M. Grant for purchase of \$100,000 water extension bonds at 103.15 has been accepted.

Eugene, Ore.—Eugene Water Board has signed contract to buy from P. E. Snodgrass half city block on College Hill to be used for location of new 3,000,000-gallon reservoir. Property is located on Lincoln St., between Harvard and Pleasant Aves.

Florence, S. D.—At special meeting of Town Board it was determined to submit to vote of people at regular spring election, proposition to vote bonds for purpose of building system of waterworks.

Halls, Tenn.—Bonds in sum of \$25,000 have been voted for installation of water and purchase of light plant.

Austin, Tex.—Attorney General's Department has approved issue of \$8,000 city of Huntsville water works bonds.